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ABSTRACT

One in a series devoted to the topic of careers in transportation, this guide, which is intended to aid in curriculum development for transportation career education in elementary through high school, provides information and models for career education and the transportation field. The four sections that comprise the guide are the following: (1) career education, reviewing its goals and four phases: career awareness, orientation, exploration, and preparation; (2) transportation, discussing its development, governmental involvement, and four major types: land, water, aerospace, and pipelines; (3) the transportation career education cluster, which fuses career education with the concepts of intermodal transportation careers (careers which contain job elements of more than one mode of transportation) and includes twelve major occupational groups and sixty-one job families; and (4) an in-depth analysis of the twelve transportation occupational groups. The twelve career service areas consist of data management, distribution, environmental protection maintenance, management, marketing, passenger services regulatory agencies, safety and security, systems planning, vehicle operation, and vehicle support. For each, section IV provides a definition, task analysis, core curriculum elements, career ladders, and recommended related courses. (EIG)

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INTERMODAL TRANSPORTATION

CAREER EDUCATION

AN OCCUPATIONAL CLUSTER PARADIGM

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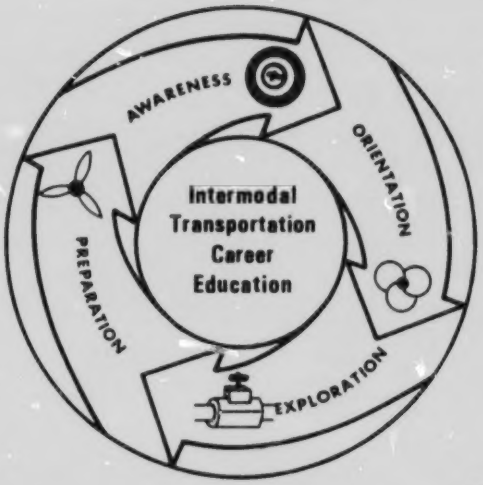

THE TRANSPORTATION CURRICULUM PROJECT

Division of Vocational Education
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INTERMODAL TRANSPORTATION
CAREER EDUCATION
AN OCCUPATIONAL CLUSTER PARADIGM

produced for

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FOREWORD

Transportation is a paradoxical industry — used whenever needed (which is often) by the public and then generally ignored. Public attitudes toward and knowledge of the transportation industry generally range from a vehement attitude and little knowledge to a passive attitude and little knowledge. Information regarding the transportation industry is scant and rarely invades the thinking of the average person, much less young persons who are choosing and preparing for a career. Because of this critical information void, attracting and training young people for careers in transportation has come mostly from within the transportation industry.

This method is no longer adequate to the increasing needs of a transportation industry which is hard pressed to keep pace with population increases and the burgeoning desire for greater mobility. A feasible solution seems to have appeared in the form of career education, which at the elementary school level introduces transportation, among other occupations, to students who are encouraged to assess their interests, abilities, aptitudes and potentials and use their assessments to begin to make career-related decisions. Students at the secondary level of career education are encouraged to explore specific transportation careers, make career choices and prepare for career entry or further educational training.

This technical paper is one product of a developmental Transportation Curriculum Project whose goals include encouraging students to explore and prepare for careers in transportation. Dedicated use of this guide should begin to solve the transportation crisis by preparing better-informed and better-trained personnel for transportation, thus assuring the creation and maintenance of ever-better means of transportation.

Peter E. Mogensen, Jr.
National Director of Education (1971)
Delta Nu Alpha Transportation Fraternity

PREFACE

Transportation, the movement of people and goods, employs over 13% of our nation's civilian working population. Almost 20% of our total expenditures for goods and services (GNP) is for transportation. Nearly 10% of our net civilian investment in privately owned tangible assets is for transportation facilities and transportation sources pay over 17% of our total federal taxes.

Increased public demand for more and better transportation has resulted in an increased demand for workers with more and better training. The U. S. Office of Education, recognizing the need for school curricula directed toward preparing people for these career opportunities, awarded a grant to the Ohio Department of Education, Division of Vocational Education for Transportation Occupations Curriculum Development within the Career Education System.

From the outset the project staff, the Ohio Division of Vocational Education and the U. S. Office of Education realized the need for initial working models for both career education and the transportation cluster. The purpose of this initial technical paper is to fulfill that need by endeavoring to:

1. Provide a structural model of the career education concept that will facilitate transportation career education curriculum development...

2. Provide a structural model of the world of work in transportation that will facilitate curriculum development...

3. Provide technical data from the world of transportation, for the project staff, consultants and others, that will facilitate curriculum development...

4. Provide technical background and resource material to teachers who will implement transportation career education programs.

This paper has been written and reviewed by professionals from the transportation industry, from career education and from transportation education; people who sincerely believe that career education is important for young people. The material presented is factual, accurate and reflects the most up-to-date thinking in transportation.

While this paper represents hundreds of hours of effort and years of experience on the part of dedicated persons in education and the transportation industry, not every bit of information nor every paragraph of advice is intended to be accepted on faith. It is, by design, a guide to be used and supplemented by local inputs to satisfy local education and transportation requirements. Attempts have been made in compiling this paper to anticipate the needs and problems of the curriculum developer who will write transportation career education programs, the school administrator who will decide to adopt the programs, the teacher who will implement and operate them and the other school and community people who will serve the program as support personnel. Success of the program will depend upon these people doing their jobs and will be measured by the success of the students choosing to pursue careers in transportation.

Edwin T. Petrie
Project Director

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This paper was developed by the project staff and the participants at a National Transportation Curriculum Development Workshop held June 1-6, 1972, in Washington, D. C. in conjunction with the United States International Transportation Exposition (TRANSPO 72) using the following procedure: (1) structure, content and objectives were written prior to the workshop by the project staff with the assistance of transportation and education specialists; (2) the writers submitted first drafts; (3) the edited first drafts were reviewed by the writers, advisors and reviewers at the workshop; (4) the writers revised their material into second drafts which were put together and edited at the workshop; (5) continuity was added and final editing was accomplished resulting in the finished product.

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I

INTRODUCTION TO CAREER EDUCATION

Career Education refers to education that is designed to provide experiences to help individuals prepare for, enter, become established and advance in, a self-satisfying and productive career. It encompasses those educational experiences which, beginning in early childhood, develop the skills, attitudes and understanding necessary to successful career selection, assimilation and retention.

Dr. S. P. Marland, Jr., Commissioner of the U. S. Office of Education, has observed that: "Educators must be bent on preparing students either to become properly and usefully employed immediately upon graduation from high school or to go on to further formal education. The student should be equipped occupationally, academically, and emotionally to spin off from the system at whatever point he chooses — whether at age 16 as a craftsman apprentice, or age 30 as a surgeon, or age 60 as a newly trained practical nurse," (DHEW, OE-72-39, 1971, p.3)

In citing the need for career education, Commissioner Marland has referred to it as eliminating the "artifical separation between things academic and things vocational." (Marland, 1971)

It is the fusing of academic, vocational and avocational experiences in a manner which will enable the individual to identify, define and realize personal, social and career related goals.

The Need for Career Education

The United States Office of Education has pointed out that "it is a rare high school that equips all of its students to make the choice upon graduation of entering the job market with a saleable skill or of continuing their education. Too often the graduate has neither option, let alone the opportunity to select one or the other. Nearly 2.5 million students leave the formal education system of the United States each year without adequate preparation for a career. In 1970, ... only about one high school student in six was enrolled in occupational education. More persons are graduating from a four-year college with a bachelor's degree than there are jobs for degree holders. By the end of this decade eight out of every ten jobs in America will not require a baccalaureate degree. More appropriate curriculums must be developed, validated, and installed, and they must be used more realistically if we are to meet the needs and desires of students and serve the purposes of society." (DHEW, OE-72-39, 1971, p.1)

Programs in career education offer a response to this challenge since the fundamental concept of career education is that all education and experiences — curriculum, instruction, counseling — should be geared for economic independence and an appreciation for the dignity of work.

Goals of Career Education

The following Career Education goals are excerpted from a working paper entitled *Career Education: Descriptions and Goals*, which was prepared by the U. S. Office of Education July 29, 1971.

1. To make all education subject matter more meaningful and relevant to the individual through restructuring and focusing it around a career development theme.

2. To provide all persons the guidance, counseling, and instruction needed to develop their self-awareness and self-direction; to expand their occupational awareness and aspirations; and to develop appropriate attitudes about the personal and social significance of work.

3. To assure the opportunity for all persons to gain an entry level marketable skill prior to their leaving school.

4. To prepare all persons completing secondary school with the knowledge and skills necessary to pursue further education or to become employed.

5. To provide services for placing every person in the next step in his development whether it be employment or further education.

6. To build into the educational system greater utilization and coordination of all community resources.

7. To increase the educational and occupational options available to all persons through a flexible educational system which facilitates entrance and reentry either into the world of work or the educational system.

Career Education as a Comprehensive Educational Program

Career education is a comprehensive educational program which begins in grade 1 or earlier and continues through the adult years. For elementary and secondary education, the program includes a restructuring of basic subjects, grades 1-12, around the theme of career development, including opportunities and requirements in the world of work. The basic academic subjects, such as mathematics, science, social studies and language arts become more relevant because the student is helped to see their relationship to future career goals. In the elementary school, students become aware of the wide range of jobs in our economy, and the associated societal roles. In junior high school students explore specific clusters of occupations through hands-on experiences and field observation, as well as classroom instruction. In senior high school, students prepare for job entry through classroom, laboratory and cooperative education activities or prepare for further education or both. Placement in a job or in further education are options open to all students. At the post-secondary and adult levels, opportunities are provided for entrance and exit at any level, at anytime, in the individual's career development.

Extensive guidance and counseling activities assist the student in developing self-awareness and in matching his interests and abilities against potential careers.

Viewed in this way career education may be described as consisting of four phases:

Phase I - Career Awareness

Phase II - Career Orientation

Phase III - Career Exploration

Phase IV - Career Preparation

Each of the four phases is described briefly below. The entire career education program is shown pictorially in the figure on the following page. Frequent reference to the figure will serve as an aid to understanding the text material.

Career Awareness

Career Awareness is that stage in the Career Education process at which the child is made aware of self, introduced to the world of work, encouraged to respect others and their contributions to the world of work and stimulated to correlate awareness of self to various occupational roles within the world of work. Career Awareness includes the following basic objectives.

The student will:

1. Formulate generalizations toward developing a sound self concept.

By — beginning to consider the ways by which individuals can be described; defining self in terms of these special characteristics; differentiating from others; etc.

2. Begin to examine the world of work.

By — formulating general definitions for work; examining a variety of individual occupational roles within the world of work, either vicariously or through some indirect or direct contact; viewing the relationships between interests and work; personal needs and work and leisure activities and work; etc.

3. Develop a basic respect for others and their contributions to the world of work.

By — playing a variety of roles designed to encourage empathetic behavior; directing this empathy toward personal thoughts, feelings and activities,

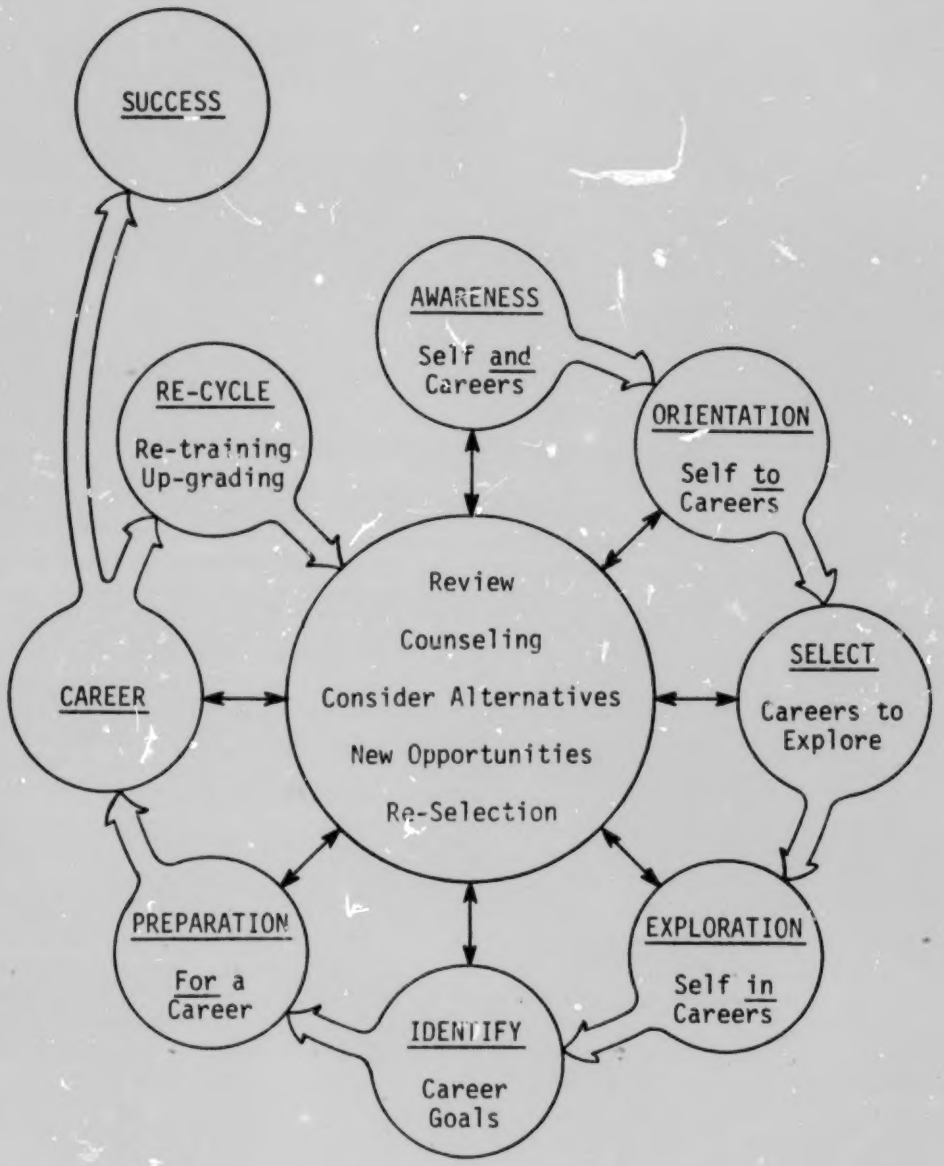


Figure 1 - Career Education Program Model

especially those which are work-related; studying such basic concepts as goods, services, consumers and producers; understanding the basic importance of work in meeting the basic needs of society; etc.

4. Begin to correlate understanding of self with various occupational roles in order to initiate a motivation toward participation in the world of work.

By — "trying on" some of the various roles performed by persons engaged in work; considering the ways in which interests and abilities can be considered in determining desirable occupational roles; learning of the interrelationships of various occupations in terms of similarities of skills, functional roles, economic categorization; etc.

The Career Awareness phase is generally referred to as including grades K through 6. However, it should be noted that grade level designations are intended only to indicate the usual or desirable occurrence of each stage in a person's overall development. To provide for individual differences, grade level indications must not be interpreted as restrictive.

Career Orientation

Career Orientation is that stage of the Career Education process at which students clarify the concepts of self and the world of work and attempt to establish a relationship between the two. This attempt to orient self to the world of work (in terms of specific occupational alternatives) is most successfully accomplished through involvement with exploratory behavior in varying degrees. Career Orientation includes the following basic objectives.

The student will:

1. Clarify self concept.

By — developing an understanding of the need to begin planning; considering the role of work in individual personality development; evaluating work's role in satisfying physical and psychological needs; etc.

2. Understand the structure of the American economic system and the interrelationships of its various sub-systems.

By — understanding fundamental economic concepts and fundamental principles of the manpower market; considering the changing nature of the manpower market, the changing meaning of work, and the relationships of education and training to work; viewing the sub-systems of the American economy at work; etc.

3. Relate self to the world of work.

By — understanding the need to plan for participation in the world of work; considering such things as self interests, abilities, aptitudes and needs in relationship to available occupational information; developing individual inquiry and problem-solving skills; etc.

4. Formulate a tentative plan.

By — considering desirable occupational roles and requisite education and training; investigating availability of desirable employment and educational and training requisites; integrating various occupational, educational and training alternatives on the basis of desirability and availability; formulating a tentative career plan on the basis of all the above considerations, etc.

The Career Orientation phase generally refers to grades 7-8. The crucial point in the phase comes at the end of junior high school when the student is confronted with the necessity for making an important curriculum decision prior to entering high school.

Career Exploration

The Career Exploration phase of Career Education, characterized by trial and hypothesis testing behavior, is one in which students actively explore real occupational roles. Problem-solving skills are applied to relating the feasibility and appropriateness of self characteristics to the occupational roles being explored and acquiring knowledge of and considering alternate occupational and educational paths. Career Exploration includes the following basic objectives.

The student will:

1. *Exhibit problem-solving and decision-making skills.*

By — recognizing the future implications of various educational and occupational alternatives; exploring various occupational clusters, relating self concepts to groups of occupations and individual occupations via occupational information and first-hand experiences; etc.

2. *Explore various occupational roles.*

By — selecting specific desirable occupations for investigation; experiencing various aspects of specific occupations via simulation activities or direct contact; coping with work tasks and performing in a work situation in a manner reflective of an understanding of the constituent elements of work effectiveness; etc.

3. *Evaluate realities of educational-occupational preferences.*

By — realistically assessing personal (abilities, interests, etc.), social (race, religion, etc.) and situational (finances, health, etc.) factors which might affect career choice, successful assimilation and advancement potentials; reformulating career plans, as well as requisite educational and training considerations; etc.

4. *Reformulate tentative career plan in light of exploratory experiences.*

By — understanding the increasingly critical nature of accurate planning; utilizing problem-solving skills acquired through exploratory behavior to reassess and restructure overall career plan (based upon desired and available educational and occupational alternatives); deciding upon a program of work or education beyond the exploratory phase; etc.

The Career Exploration phase is generally associated with grades 9-10. It is imperative that students be made aware of the increasing importance of planning and become directly involved with activities which will develop the skills and knowledge essential to successful planning.

Career Preparation

Career Preparation is the phase of Career Education during which students develop specific skills, technical knowledge, sound work habits and attitudes related directly to a specific occupation or family of occupations. These are developed through direct involvement in occupational experiences, either within the setting of the school or without. Career Preparation involves the following basis objectives.

The students will:

1. *Prepare to implement a chosen career plan.*

   By — searching occupational and educational information and determining appropriate educational and vocational objectives; engaging appropriate available experiences for skill and knowledge acquisition; completing appropriate curricular offerings available; etc.

2. *Obtain initial employment or enroll in appropriate requisite educational program(s).*

   By — determining specific occupation (or occupational family) for which employment and requisite education beyond high school (if any) is to be sought; applying, with assistance from guidance personnel, for appropriate educational or occupational opportunity; completing appropriate curriculum requirements prior to job or post high school educational assimilation; etc.

Career Preparation may be secured through a number of differing approaches: high school cooperative programs, correspondence courses, adult education offerings, technical institutes, community and four-year college programs and post graduate university programs. This phase generally refers to the last two years of high school (grades 11-12) and beyond.

Summary

In summary, career education implies a comprehensive structuring of the entire school program around a career development theme. It begins with the development of self concepts, desirable attitudes towards others and an understanding of and appreciation for work; progresses through orientation to the

world of work, exploration of and preparation for specific occupations; and culminates in attainment of specified occupational goals.

II

INTRODUCTION TO TRANSPORTATION

Transportation is a system that moves people and goods. It is a man-machine system that includes the physical conveyance, the motive power that moves it, and the way through or over which it moves. It is a system that is vital to man's existence. As expressed in a 1961 Congressional Report, *National Transportation Policy:* "Transportation is one of the tools required by civilized man to bring order out of chaos. It reaches into every phase and facet of our existence. Viewed from every standpoint, economic, political and military, it is unquestionably the most important industry in the world. You can no more operate a grocery store or a brewery than you can win a war without transportation. The more complex life becomes, the more indispensable are the things that make up our transportation system."

IMPLICATIONS IN EDUCATION

Transportation is not only a man-machine system in the sense expressed above but also a sub-system of the social-cultural-political system of the world. It is not only a system of technology but one that includes man as an individual and man in groups with varying purposes.

As the physical wants and needs of man, such as safety, security, social esteem, self-actualization, etc., have varied over time, so have the purposes of the transportation system varied. Transportation as a means to satisfy needs and wants of

man is deeply imbedded in the infra-structure of service responses and thus is a highly complex phenomenon to understand and control as man proceeds toward his goals.

As the goals of society have changed from defense, to peace, to exploration, to economic growth, so have the responses required of the transportation system changed. National defense and military necessity have spawned much of the progress in technology within the various modes of transportation. Transportation now faces the problem of peaceful adaptation of this technology to man's needs.

While there has been outstanding development in the technology of transportation, the application of that to the achievement of man's social and economic goals involves many complex problems. Education has an essential role in developing an understanding and disseminating knowledge, skills, and attitudes about and for the transportation system.

Man is both the creator and the creature of the system. The complexity of technology has created a new relationship between man, his education and his work in the transportation system. Whether he be the designer or planner, the operator or the manager, the user or the benefactor of the transportation system the educational requirements are complex and constantly changing. This calls for a massive response by the total educational community at every level of activity, both in formal classroom arrangements and in a variety of school-community situations.

Recognizing the need for education and training in transportation careers, the U. S. Office of Education, through the Career Education System, funded a project to determine what direction the curriculum for such instruction should take. The workshop convened as part of that project resulted in both transportation and education practioners defining an *Intermodal Transportation Career* "as one containing job elements common to more than one mode of transportation. Thus, intermodal transportation skills are those which refer to occupational groups where job families can be identified and a ladder of progression or promotion is apparent, but where skills are not restricted to one mode or means of transportation."* The workshop report further stated that future educational programs should be built around this definition.

**Intermodal Transportation Careers: A Guide for the Development of Educational Programs*, Division of Adult, Vocational and Technical Education, U.S. Office of Education, Washington, D.C., 1971, p.20.

These new educational programs in transportation must be multi-disciplinary in design and intermodal in their approach to student learning. In other words, transportation is a total system and it must be studied in terms of the system rather than as a distinct modal or disciplinary unit. Furthermore, there must be a strong and continual relationship placing education between the individual and his work.

Educators developing these programs must realize that in order to appreciate the complexities of the transportation system one must understand its significance to our society as a whole as well as its importance to the economic and political development of our nation and the world. Its social and environmental aspects as they pertain to "progress" in transportation activities should also be well understood. The "system" of transportation as a whole, and the interrelationship of the modes should also be understood along with the government's role in transportation.

DEVELOPMENT OF TRANSPORTATION

Influence of Geography

Both the size and the nature of the natural features of the United States have had important and significant influence on the development of its transportation system. While mountains generally are obstacles to the building of roads and railroads, rivers early provided relatively easy access to the far reaches of the nation. Moreover, the size of the country presents both a challenge and a deterrent to the development of transportation.

The existence of transportation facilities gives some cities their unique character as a port city, hub city, air capital, or manufacturing and distribution center. As a result, the transportation system of today reflects the alternative choices in direction and mode as dictated by geography. Only the development of an airplane has enabled us to break the fetters of geography. But even here, because of the congestion of airways between large cities, geography again threatens to saddle transportation development with another barrier — the lack of air space.

Influence of Technology

Technology — man's know-how — has also played an important role in the development of transportation. From the

earliest times, man has sought the means of transporting himself, his materials and goods from place to place resulting in far reaching inventions ranging from the wheel to the jet engine and rocket.

The taming of animals and harnessing them as a means of power has been known since the earliest of times. However, it was not until man built ships that he was able to make a significant improvement in his means of transportation. The discovery of America is a prime example of the influence of ships on the course of history. The development of the steam engine in the late 18th and 19th centuries spurred further developments in transportation, most notable on the lakes and rivers of our country. The steamboat opened up great stretches of inland America and for half a century it was the epitome of fast, efficient and reliable transportation in America.

Land transportation was slow in developing until the invention of steel rails to support the application of the steam engine. The development of rail transportation with its added characteristic of flexibility, because it was not tied to natural features on the land surface, spurred additional rapid development of the economy of our country. The railroads reigned supreme as a factor in economic development throughout the 19th century.

In the 20th century the development of the internal combustion engine and the creation of hard surfaced roads gave us the automobile, the truck, the bus and the elaborate highway system which provided increased mobility, comfort and flexibility to satisfy the rising expectations of all Americans.

Mid 20th century development in jet engines and rockets provide increasingly sophisticated motive power enabling man to defy gravity and to promote even greater mobility to satisfy his seemingly insatiable appetite for faster, more comfortable means of transportation.

Undoubtedly, the future development of transportation will reflect man's inventive genius in response to his eternal quest for independent mobility.

General Significance of Transportation

Without transportation, modern society could not exist. There would be no metals, coal, oil, or their products. Man would spend more time raising food and then be limited to that which would grow in his own neighborhood. Transportation speeds

doctors to the sick and policemen to the scene of crime, wings athletes to international games and rushes aid in time of disaster. In 1890, the average person traveled about 200 miles per year. Today, through means of modern transportation he travels 4,000 miles per year, 3,600 by automobile.

Transportation is a function of our culture and our heritage. Steamboating, railroading, the Pony Express and the long, dusty cattle drives fabled in history and folk songs, are an expressive example of the pivotal role that transportation played in the discovery, settlement and development of our nation. The freedom and mobility of our people — literally a nation in motion — is based on transportation. Recent successful Apollo flights are but the latest chapter in man's eternal quest for mobility and they add yet a new dimension to ways in which transportation affects the economic, social and political functions of our nation — and the world.

Transportation is a prime factor in the social and cultural unity of our nation. The "melting pot" concept is a direct reflection of the travel and exchange of goods which has contributed to the interchange of ideas and the breakdown of parochialism, thus encouraging the mutual understanding, economic interdependence, and political unity which is the basis for our standard of living; the highest in the world.

A generation ago, it was only the wealthy who could enjoy the products from distant lands. The development of transportation and related technology has made such products available to all.

Until recently, only the more affluent could enjoy the fruits of travel to exotic parts of the world. Today's jet age has shrunk the world in time and cost so as to make foreign travel and all of the cultural and educational benefits that go with it within the reach of the factory worker, the secretary and the bank clerk on a week's vacation. Even space travel for many is now within the realm of possibility within the 20th century.

Modern transportation has, since history has been recorded, contributed to the political unity of nations. Along with the exchange of goods and ideas which encourage mutual understanding and economic interdependence, rapid means of transportation promote the feasibility for unification of political units.

Ancient Egypt was held together for centuries by the Nile River. Ancient Rome's uniting force was its excellent road system. Ancient Greece, on the other hand, with a mountainous

and segmented land surface which hindered transportation, remained a group of independent and squabbling city-states until it fell victim to outside conquerors.

Colonial America, despite a common heritage, seceded from England because slow and inefficient transportation could not sustain a viable political administration or mutual understanding. In later years, federal support for a transcontinental railroad helped retain California as a member of the Union during the Civil War. Similarly, the first Canadian transcontinental railroad was an effort to insure that British Columbia remained a political part of Canada. Also, railroads played key roles in unification efforts in Australia's great desert regions and in Bismarck's unification of many small independent states and principalities in Germany.

Good transportation is fundamental to national defense. The ability to mobilize industrial power and to move men and material quickly is essential to deter aggressors, which is more important than ever in this age of global unrest.

Economic Significance of Transportation

Transportation is an important basic foundation for economic development. It is an integral part of production and distribution, neither of which is possible without efficient and inexpensive transportation. A prime requisite for loans to underdeveloped countries is an adequate transportation system. Without it, there is little use to construct expensive industrial plants or to hope for broad distribution of goods.

The economic development of the U. S. has gone hand-in-hand with the development of one of the finest transportation systems in the world. Many important raw materials are found in abundant supply far away from production centers. For example, iron ore from the Mesabi Range in Minnesota, Labrador and Venezuela are carried via ocean vessels, lake boats, railroads and trucks to U. S. steel manufacturing centers. Here they are shaped into semi-finished products and again transported to manufacturing plants for the production of consumer goods such as automobiles, refrigerators, machinery and equipment. At every state in this complex process the value of the material has been significantly enhanced by transportation.

Transportation is the determining factor in the location of production facilities with respect ot the location of markets. It creates value by changing the position or location of things and

people; often referred to as creating "place utility." Modern large-scale production is predicated on the efficient movement of raw materials, workers and parts for assembly to places where they can be used to create consumer products.

"Time utility" is another value created by transportation. In addition to getting items and workers from one place to another, their timely insertion into the production process is critical to the successful functioning of modern production. Delays in time can seriously affect the cost of production. While storage of necessary components may avoid delays caused by shortages, the cost of storage can be significant in determining the feasibility of the production facility.

As with production, transportation plays a significant role in the distribution process. Again, it adds value by creating "place" and "time" utility. Consumer products must be moved from their place of manufacture to places where they are needed or demanded. This movement creates value. The time it takes to deliver and market these items is a value that is governed largely by the transportation involved. In other words, transportation allows mass distribution to operate.

In summary, transportation helps bring about regional specialization and the division of labor which are basic to the economic growth and development of our nation. Each region is able to concentrate on the goods and services for which it is best adapted. The products and services of these specialized areas can be exchanged with products and services of other areas for mutual benefit. All of which adds up to more goods and services at lower prices for more people to enjoy, thus making transportation a basic factor in our high standard of living. Indeed, transportation is most important to the economic progress of our nation. Altogether, transportation services represent more than 20% of all goods and services produced each year.

Environmental and Sociological Aspects of Transportation

Rapid and accelerating change in transportation technology is creating manifold problems that pervade the very fabric of our society. The whistle of the train, the noise of the truck and the roar of the airplane, once symbolizing "progress," now are being evaluated in terms of "social costs." Society is beginning to examine the relationships of technological "knowhow" and "public good" in terms of the "quality of life." Put simply, is the economic good worth the social costs? The environmental and sociological aspects of transportation are considered here in terms of social costs.

Transportation and environment are closely interactive. On the one hand, as discussed in the early historical development, the physical environment shaped transportation. On the other hand, as manifest by the many congestion and pollution problems of today, transportation most definitely has shaped the environment. This interaction is twofold: (1) the effect of location of transportation activity, and (2) the effect of new transportation activities themselves. The effects of these are both good and bad.

Location

Historically, the location of transportation was dictated by economic considerations. It gave unique character to the surrounding environment. For example, "railroad town," "port city," "hub city," "The Loop," "air capital" and "mill town" are direct reflections of transportation activity. While they have more often been regarded as positive symbols of progress, development and economic activity, they also represent negative environmental aspects such as the rowdiness of a port, the dirtiness of a railroad terminal, the bleakness of a warehouse district and the noisiness of an airport; all elements of the new concern for "social costs."

While little can be done about existing locations of transportation activity, much effort and attention are being applied to the location of new transportation facilities. Communities now are addressing themselves to hard political decisions regarding the relative merits of economic benefits to be gained from new transportation activity and the social costs involved. In the final analysis, transportation is so essential to modern life that it cannot be denied. Therefore, whatever is decided will only change the kinds of interaction between the environment and transportation activities.

Operations

Operational activities of transportation have an even greater impact on the environment. Here too are social costs such as pollution, congestion and ecological interaction. There is no question that transportation operations contribute to air pollution. Smog and haze over much of our nation are attributable to the internal combustion engine which powers most of the vehicles used in transportation. Technological remedies are available but at an economic cost, and the question of balancing the cost of automobiles with social costs is central in the nation's legislative and regulatory activities.

Water pollution is another visible residual of transportation activity. This presents somewhat less of a problem in terms of control, but here too, social control in the form of regulations and legal action will be reflected in a trade-off between economic benefit and social cost. Increasing operational activities in all transportation modes creates noise pollution at alarming levels of intensity, particularly in large urban areas of the nation. Once more a social cost is involved, and there is no agreement, as yet, about who will pay the cost of decreasing the noise levels caused by operation of transportation facilities.

Congestion costs time and money to all users of transportation. Streets, highways and airways all contribute their share to these costs. While technology has helped create congestion, it also can help solve the problem, it remains for society through its institutions to bring about a system that minimizes congestion and maximizes the mobility that transportation provides.

Operation of the transportation system also affects ecological systems by interrupting or deterring the carefully balanced sequence of creation, birth, life and death. Effects of oil spills on marine ecological systems and the effects of smog on forests and plants are but two examples. The exact nature of the effect on ecological systems is not known, but it too, becomes a social cost of transportation.

Transportation activities also have sociological interactions which are the subject of study by sociologists, anthropologists, geographers and others. Such concepts as "bedroom community," "warehouse district," "central business district," "main line commuter," "resort-vacation-amusement district" exist because of transportation activities.

In addition, the elements of transportation have provided a variety of sociological status symbols. Ownership of a boat, a private plane or a riding horse means "status" in some communities. However, certain brands of automobiles as well as their ownership are the most common and readily recognizable status symbols in our nation. Thus transportation activities go far beyond providing just mobility in a modern industrial society, which complicates the solution to the problems created.

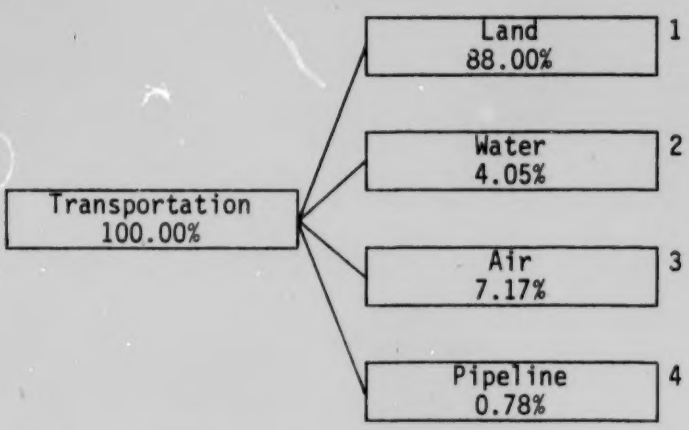
In summary, transportation problems are those stemming from failures in the processes by which society and technology interact and from failures in the institutions which have been created to promote or, in some cases, to deter such interaction.

THE TRANSPORTATION SYSTEM

Today's transportation service is performed by four major modes: land, water, aerospace and pipelines. Each has certain characteristics, advantages and disadvantages. While various modes are in competition with each other, they also cooperate, thus giving rise to the general term "transportation systems." On the other hand, the lack of uniformity in scheduling and pricing practices among and between the various modes points up the fact that we have not *a* system, but *many* systems of transportation.

Historically, the modes of transportation have been under separate ownership and management. Moreover, they have developed at different periods and are in different stages of development, economically and technologically. However, they all have one common characteristic: production of transportation service.

Transportation service involves the transport of people and goods in varying quantities using several technological means. The following account is to acquaint the reader with an overview of the "system" and an insight into the relationships between and among the modes.



1 See Figure 2
2 See Figure 8
3 See Figure 9
4 See Figure 11

Figure 1 - Total Transportation Bill (1970)*
Modes as a percentage of total.

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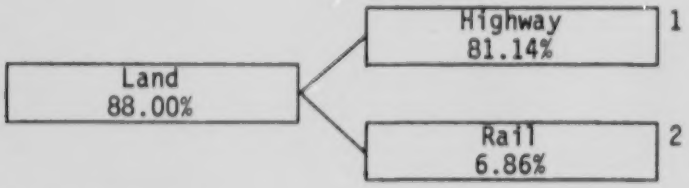
*Statistics for figures 1-11 from "Breakdown of Nation's Estimated Total Transportation 'Bill': 1970", *Traffic World*, September 20, 1971, p. 93.

In the discussion of the various modes, sub-modes, etc. that make up our transportation system it will be helpful to have some means to compare them. Figures 1 through 11 show these comparisons by indicating the amount of business of the industry as a whole. For instance, Figure 1 shows that 88% of the nation's transportation business is done in the land mode, 4.05% in the water mode, 7.17% in the aerospace mode and 0.78% in the pipeline mode. All percentages in the figures indicate that segment's business as a part of the whole.

Land Transportation

Transportation over land is the major mode for movement of people and goods in our nation, accounting for 88% of the total dollars spent on transportation. This mode has two major sub-modes in highway transportation and railroad transportation.

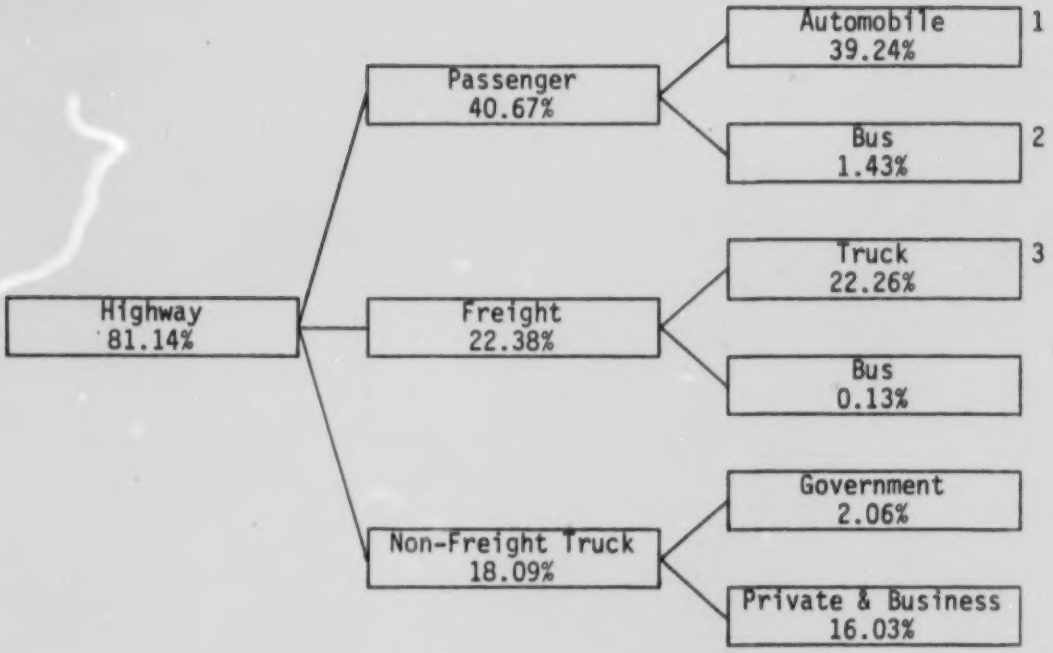


1 See Figure 3
2 See Figure 7

Figure 2 - Transportation Bill (Land)

Highway Transportation

The technological development of the internal combustion engine and the highway system during the 1920's heralded the rise of a transport system that would literally change the American way of life.



1 See Figure 4
2 See Figure 6
3 See Figure 5

Figure 3 - Transportation Bill (Highway)

Automobile. Urban growth is a direct reflection of the growth of transportation. A five-mile commuting radius was typical in the city of 1900. Today, particularly with the development of the automobile, this commuting radius has expanded to 25 miles — covering an area 100 times larger than the largest city at the turn of the century.

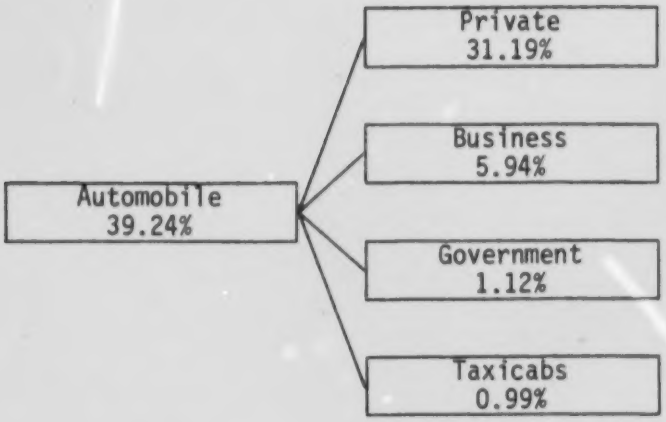


Figure 4 - Transportation Bill (Automobile)

The expansion continues. Today, more than two-thirds of all Americans live in urban areas. By 1980, three out of every four will be living in and around cities. Indeed, this expansion will cause many metropolitan areas to meet and merge into what has been named megalopolis, from the Greek meaning great city. This large scale concentration of people in cities has been brought about by improved transportation but many transportation experts now say that cities have grown to the point where they threaten the very transportation that made them possible. Indeed, every city is now faced with a transportation problem of staggering proportion, and one which will undoubtedly get worse before it gets better. Basic to the problem is the fact that most people are seeking means of transportation that will provide them with the combination of convenience, comfort, flexibility, privacy, speed and economy; a combination which thus far is best represented by the private automobile. Any transport alternative to the automobile must approximate this combination of qualities if it is to gain public acceptance.

Truck and Bus. The typical motor carrier firm started with a very modest amount of capital. In addition, the absence of legal restrictions, the minimal skills needed for operation and management and the existence of a public highway system, contributed to the rapid growth of motor carriers performing a myriad of general and specialized transportation services.

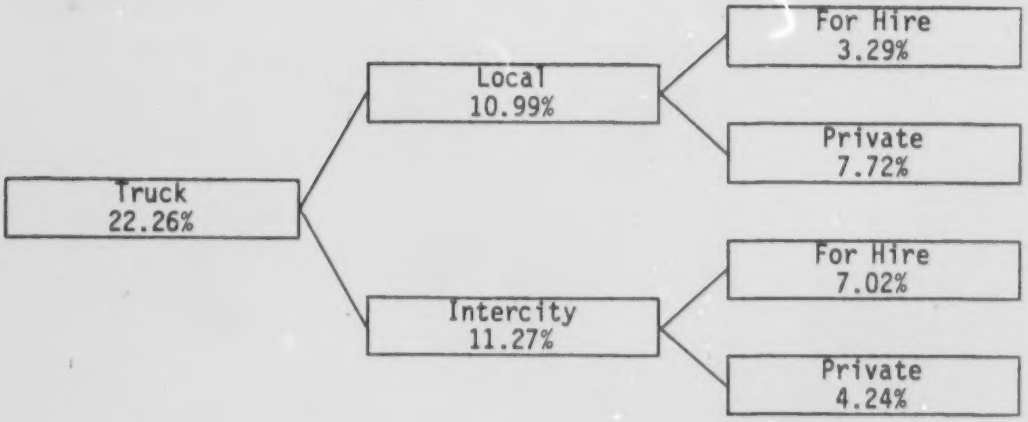


Figure 5 - Transportation Bill (Truck)

Since 1916, when federal aid for highways was begun, highway use has grown to represent a significant portion of the nation's transportation activity. Twenty-one percent of all intercity movement of goods is by truck, and virtually all movement of goods in urban areas is by truck. Future developments in the trucking industry include improved truck design and more efficient handling of goods, particularly at terminals. Automation, computerized control, and containerization are major elements in these developments.

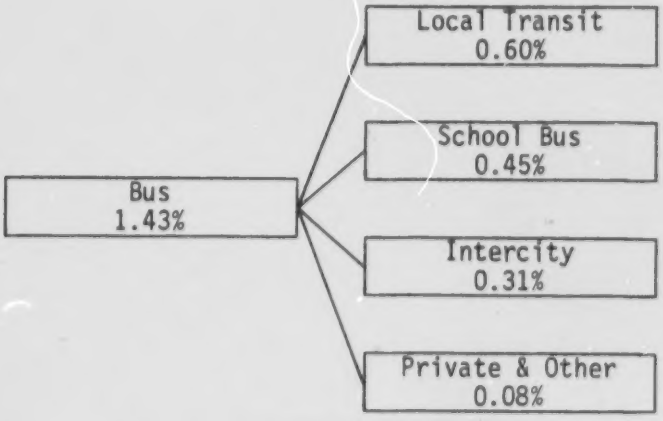


Figure 6 - Transportation Bill (Bus)

The bus has not proved to be a successful means of mass transportation in urban areas. Nevertheless, increased attention is being given to preferential use of existing highway lanes, as well as the development of the median strip for exclusive bus use, in order to increase capacity and speeds, reduce accidents, and provide comfort and convenience to commuters.

Future growth of both truck and bus transportation will be subject to increased public attention and controls based on the social costs in congestion, pollution and safety.

Railroad Transportation

The railroad is the dominant mode in the transportation system in terms of the movement of goods. Its role in passenger traffic has decreased significantly since the development of the automobile and the airplane, and only recently with the inception of AMTRAK — the National Railroad Passenger Corporation — has there been any concerted effort to recapture a share of that market.

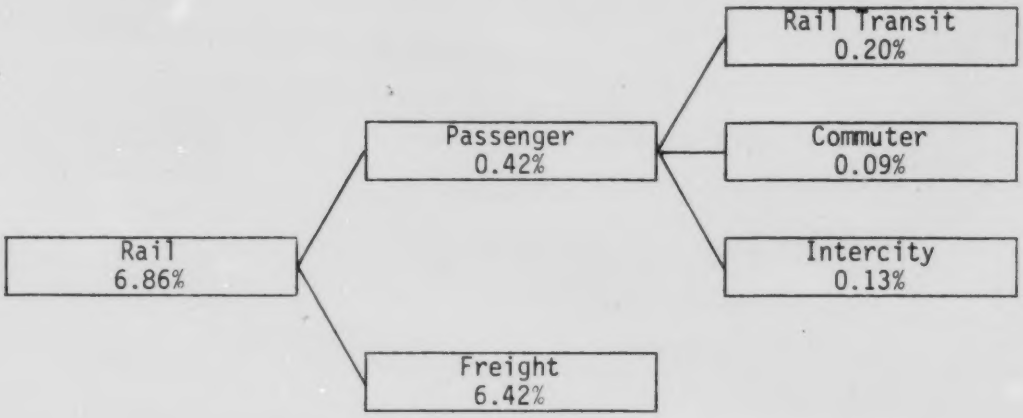


Figure 7 - Transportation Bill (Rail)

The railroad industry represents a substantial investment and it ranks as one of the most important in the economy, both from the aspect of an employer (600,000) and of invested capital ($30 billion).

In response to the demands of more and more people for more and more goods, the prospects are bright for growth in railroad freight operations. Estimates indicate a 50% growth by 1980 and a doubling by 1985. Much of this growth is predicated on increased efficiency through technology. Short and long term efforts are directed toward higher horsepower and lower maintenance powerplants, such as diesel-electric and nuclear-electric units. In addition, technology is being applied to improvements in roadbeds, management information systems, and to advanced electronic control devices to promote both speed and safety. Moreover, there will be more and more automation to facilitate handling of goods and increased containerization of items for shipment.

In terms of passenger service, technology is being applied to increase the comfort, speed, and safety of trains, particularly for the high-density population centers. The Metroliner rail route between Boston and Washington, D. C. is an example of high-speed ground transportation designed to compete favorably with highways and airlines. The new cars are electric-powered, self-propelled, air conditioned, and operate independent of each other. Wall-to-wall carpeting, telephone service, roomy accommodations with bar facilities and special insulation to reduce noise and vibration combine to provide speedy yet comfortable and safe transportation for a growing number of travelers who see it as an attractive alternative to the automobile or the airplane.

Increased attention is being given to a variety of new designs and systems that can provide even more effective mass transportation; such as going underground to free valuable above-ground space for other developments. Auto-Train, a bi-level railroad carrier which carries people and their cars, is already proving to be successful from the Washington, D. C. area to Sanford, Florida near Disneyworld.

Piggy-back operations (trailer or container on flat car) are of increasing significance to railroads to make their operations compatible with other modes of transportation, thus promoting the efficient articulation of modal transportation services.

Water Transportation

The volume of all of the earth's water totals about 340 million cubic miles — of which only about two percent exists as ice — with most liquid water existing in the oceans of the world. But on the North American continent, mention must also be made of the five Great Lakes — Erie, Huron, Michigan, Ontario and Superior — which with their connecting smaller lakes and rivers cover

95,000 square miles. They contain nearly 5,500 cubic miles of water — about one fifth of all the fresh surface water on earth.

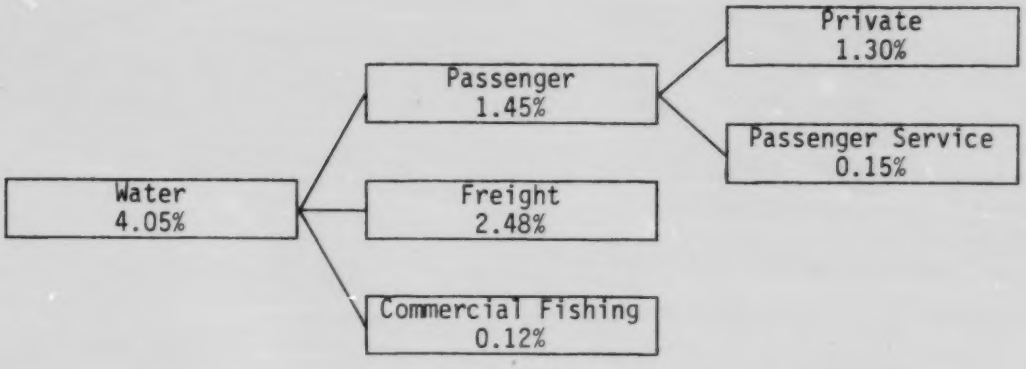


Figure 8 - Transportation Bill (Water)

Literally since the beginnings of the United States and Canada, these Great Lakes have been of vast importance in transportation, bordering as they do on two countries, eight of the U. S. states and one Canadian province. They have provided a waterway of immense distance, extending from Duluth, Minnesota, east to Kingston, Ontario, and south to Chicago, Illinois, and Cleveland, Ohio. With the completion of the St. Lawrence seaway project — a joint development of the United States and Canada — this system was also connected with the ports of Montreal and Quebec City and to the whole Atlantic Ocean.

Spectacular as such water systems are, it is also true that possibilities for use of water transportation are not evenly distributed in this country. On a nationwide basis, both air and land transportation are put to more frequent use. But where possibilities for water transportation exist — even though this is true of only a limited segment of the country — it provides the lowest per unit cost of all transportation modes.

Inland and coastal waterways represent the oldest form of transportation now in use. Because of its nature, water transportation has never enjoyed the spectacular growth of the motor carrier or the airplane. At the same time, it provides the lowest per unit cost of all transportation modes, and it will continue to be a significant factor in the movement of bulk products, such as petroleum, chemicals, grain, coal and building materials.

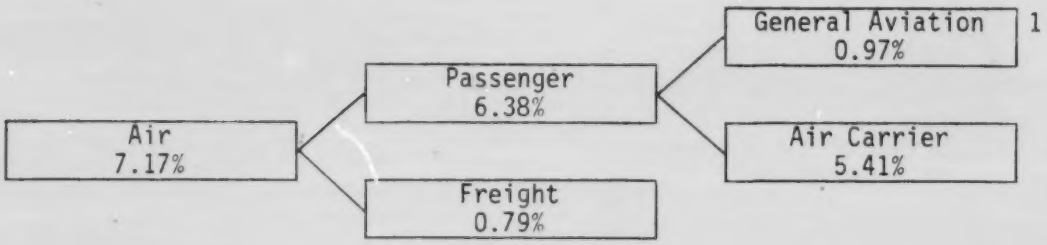
Being limited to natural or artificial waterways, the waterway system, totalling about 27,000 miles, will necessarily be useful to a small segment of the nation. Nevertheless, waterway transportation will continue to be an important factor in our economic, social and political development.

It is the increasing competition from other modes that is forcing water carriers to develop more efficient vessels and operating conditions. In addition, much attention is being given to developing an intermodal capability by new port design for containerized operations.

As a result, water carriers will probably continue to be a significant factor in the movement of bulk products, such as petroleum, chemicals, grains, coal and building materials.

Air Transportation

The growth of air transportation is perhaps the most remarkable development of the 20th century. It provides virtually unlimited mobility to hundreds of people all over the world. In terms of time, air transportation adds a new dimension to every facet of man's existence.



[1] See Figure 10

Figure 9 - Transportation Bill (Air)

The major elements of the air transportation system are: (1) air carriers which account for only 2% of the aircraft flying our skies, (2) military aviation, flying 20% of the aircraft, and (3) general aviation which accounts for 78% of the aircraft being used.

Air Carriers

Like the railroads in an earlier era, air carriers developed as instruments of national policy to maintain world leadership. Like the railroads, air carriers received substantial government subsidy in the form of mail contracts to help offset the huge investment necessary. Subsequent economic and technological developments have made the air carrier system the dominant means of intercity and inter-continental travel.

From 1945 to 1960, air carrier transportation grew largely at the expense of the railroads. Since 1960, however, the air carrier has penetrated the intercity travel by automobile. In 1972, more than 7,000 new U. S. passengers were turning to air travel each day. By 1985, it is predicted that the airlines will carry close to five times as many passengers as in 1972 — about 800 million. Growth in air transport of goods is even more impressive, attributable to technological developments in larger aircraft and improved handling techniques such as uniform containerization. An average annual increase in air freight of just under 20% appears reasonable, compared with a 12% average annual increase in passengers predicted for the next decade.

Future growth of air carrier transport, particularly in urban areas, is dependent upon technology to provide effective means of short take-off and landing, the reduction of noise to acceptable levels, plus a system of interface with other modes of transportation and the ability to coordinate long-term planning activities with short-run demands for service.

Military Air Transportation

Needless to say, the use of aircraft has revolutionized our whole defense structure. It has provided a degree of mobility for both men and materials of which we had not previously even dreamed.

The future role of military aviation will continue to be tied in with national security but its numbers of aircraft and operations will vary directly with the extent of the nation's commitment. Additionally, military aircraft design and operability will continue to be precursors of things to come in civil aviation. This mixed blessing will be the subject of much discussion among all concerned.

General Aviation

As with the automobile in land transportation, the application of modern technology to the development of light weight materials and their fabrication into small, efficient and relatively inexpensive aircraft, has brought about a large and rapidly growing fleet of airplanes that add a new dimension to air transportation.

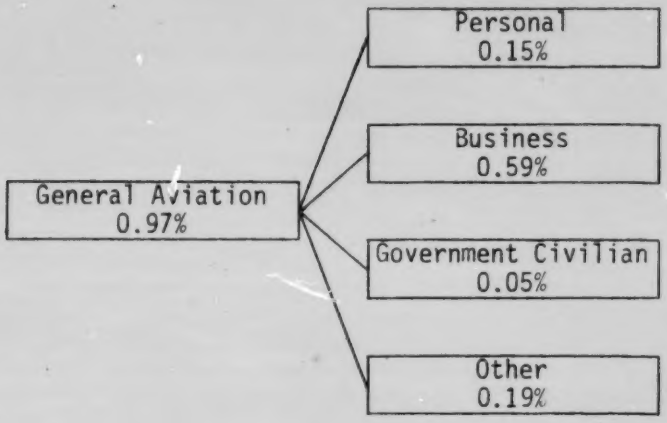


Figure 10 - Transportation Bill (General Aviation)

The general aviation fleet includes types of aircraft ranging from homebuilt or sport aviation models through helicopter hoists, aerial applicators, flight instruction, mail cargo, air taxi and business or executive transportation. More than 30,000 companies in the United States own, operate or lease aircraft for business purposes.

In terms of numbers of aircraft and operations, statistics show that the general aviation represents 78% of the aircraft in the total air transportation system, 91% of the 730,000 licensed pilots, 79% of all civil aircraft hours of operation, and 50% of the passengers in intercity travel.

In terms of airports, general aviation uses all of the more than 12,000 airports in the nation where air carriers use only 531 of the 817 that are considered adequate for their operations. Indeed, general aviation provides the only air access to 92% of the nation's airports.

Forecasts by the FAA predict that the number of general aviation aircraft will increase 41% by 1976, as compared to approximately 10% for air carriers.

In summary, general aviation is a large and rapidly growing factor in the air commerce and transportation activities of our nation. Its future role, as well as that of the air carriers will depend upon our ability to resolve the problem of air space. Increased traffic, particularly at times of inclement weather, places a great burden on the air traffic controller in spacing and sequencing air traffic to insure maximum safety with minimum delay. Automation and computerization of the air traffic control system, plus innovative devices for collision avoidance are promising developments for the future growth of the air transportation industry.

Aviation — air carrier, military and general — offers growing numbers of career opportunities for those who are willing to qualify. There are as many as 100 non-flying jobs for every flying position. Also, with the mobility of our population and de-centralization of industry aviation jobs are becoming available at many more locations throughout the nation.

Pipelines

Pipelines are a unique mode of transportation. Although one of the oldest in terms of man's history, its full development is rather recent in the U. S. It's beginnings followed the discovery of oil in Pennsylvania in 1859. Pipelines provided a quick, direct and low cost means of transporting crude oil which has contributed to their rapid growth into one of the nation's most efficient means of mass overland transport. Pipelines carry forty percent of the country's fuel energy and exceed both the rails and airlines in size. The pipeline system extends into the forty-nine continental states with a vast underground system of pipes totalling a million miles.

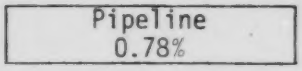


Figure 11 - Transportation Bill (Pipeline)

The application of modern technology to the preparation of solids, called "slurrying," plus innovations in containerization

along with automation and computerized controls, points up an exciting new dimension in pipeline transport.

All in all, a combination of low cost and a high degree of automation, and the fact that it is almost entirely unaffected by weather, make pipeline transportation a significant and growing element in the transportation system.

New Modes and Systems of Transportation

Modern technology has helped man harness the forces of nature to provide him with more power and speed than is practical for his use. Indeed, the pace of technology with respect to transportation, has produced side effects of congestion and pollution that are negating the benefits originally intended. Therefore, much attention is now being directed toward new power sources and modal arrangements that will help bring man into a more harmonious relationship with the machine. Some examples of these efforts are listed below.

Highway Transportation

1. Automatic electronic devices to control speed and separation between vehicles to reduce driving error and thus increase safety.

2. Gas turbine and all electric power units to reduce noise and toxic emissions.

3. Radio and electronic aids to improve communications regarding weather and road conditions.

4. Computerized traffic signals to reduce delays in congested urban areas.

Rail Transportation

1. Automation and computerization in signaling, remote route selection and collision avoidance to increase safety and reduce delays.

2. Air-cushion guided ways combined with linear induction electric drive for speed with safety and comfort and reduced noise and air pollution.

3. Diesel-electric power plants to reduce noise levels and toxic emissions.

4. Monorail overhead and underground systems to reduce use of precious surface areas in cities.

Water Transportation

1. Marine radar and electronic aids for navigation and collision-avoidance.

2. Automation and computerization of controls on ships.

3. Containerization of goods and improvements in design of port facilities to facilitate intermodal transportation.

Air Transportation

1. Inertial guidance systems for more accurate positioning of aircraft to improve navigation.

2. Automation and computerization of surveillance radar systems to control aircraft movement in the airway system for increased safety.

3. Electronic aids in aircraft and on the ground for better collision-avoidance.

4. Automatic landing systems to increase safety and to permit operations in all kinds of weather.

5. Improved jet engine design to reduce noise levels and emission of pollutants.

6. Improved aircraft design for short take-off and landing to facilitate air transport in urban areas.

Hybrid Transportation

1. Automobiles designed for dual mode of operation; as a conventional wheeled vehicle or as an automatic rail-guided one.

2. Tube (pipeline) transport for people as well as goods and materials.

3. Conveyor belt "people movers" in congested urban areas and airports.

4. Containerization of goods in pallets or plastic envelopes to facilitate rapid transfer from one mode to another.

In summary, all of the above innovations and systems signal a new look for technology. Instead of a simple product orientation which has produced an almost overwhelming variety of machines and equipment, the present effort places a new emphasis on systems, integration, coordination, and safety plus the elimination of congestion and pollution that are oriented to function rather than vehicle improvement. This attitude was expressed in the first International Transportation Exposition held at Dulles International Airport, Washington, D. C. in May and June of 1972. The ultimate goal of this exhibit was to bring together not only the equipment and technologies from nations of the world, but also the people who will be creating solutions to tomorrow's transportation problems.

GOVERNMENT'S ROLE IN TRANSPORTATION

Transport services are provided through a complex system of independent modes, each evolving out of economic conditions and technological advances of a particular time in our nation's history. Society's response in terms of ground rules for transportation evolved more slowly, often too slowly for effective policies to promote both the "public good" and the sound growth of the transportation industry.

Early in the development of the United States, when the necessity for adequate transportation was great, most efforts were devoted to the promotion and development of an adequate system of transport. Consequently, society was more concerned with conquering the continent than with stringent regulations. In fact, grants of land and charters for exclusive operating rights tended toward monopolistic type activities, wherein one carrier or mode had virtually exclusive rights to serve a certain area. Railroads were an early form of monopoly enterprise.

While such monopoly arrangements were beneficial to the development of transportation, and thus helped develop our young nation, the attendant unrestricted power contributed to numerous abuses in rates. As a result, the public instituted a variety of social controls.

Basically, social control of monopolies was directed toward increasing competition among railroads. However, instead of improving service to the consumer, such regulations brought about a deterioration in both quality and quantity of service, as well as serious financial losses for the carriers. It pointed up the inadequacy of simple "police" action in a complex business activity such as transportation.

Subsequent governmental actions were based on a more "positive control," where regulations insured that railroads would earn a "fair return on a fair value." This doctrine served to limit competition among the railroads, but it came too late to help them prepare for the changing character of the transportation market in the 1930's which was brought about by the development of the automobile and the highway system.

The evolutionary process eventually culminated in the passage of The Transportation Act of 1940, which served to focus attention on the idea that each mode is part of an integrated transportation system, based upon inherent advantage of each mode, with controlled competition. However, the implementation of this policy continued on a modal basis.

Finally, in 1966, Congress clearly recognized the idea of an integrated transportation system by creating the Department of Transportation as a coordinating, planning and operating agency. A former Secretary of Transportation, John A. Volpe, further defined the charge of the Department of Transportation by stating that "we must have a balanced, coordinated transportation system, and this means one not weighted for or against one mode or another." In addition, he stated that "balance means to have enough of the right mode in the right place at the right time."

In summary, the role of government in transportation development has evolved from one of "hands off" to one of "participatory involvement." The ultimate benefit in this vital activity requires the best from everyone concerned and most particularly from the educator who has a crucial role to play in the entire process.

SUMMARY

To paraphrase Dickens; these are the best of times, these are the worst of times. On the one hand, we have experienced through our transportation system a mobility that was but a dream

a decade ago, Yet, on the other hand, we are experiencing less enjoyment of life because of the congestion and pollution that is largely a result of transportation. On one hand, we are saying that more technology will solve these problems created by transportation and on the other hand, there are those who demand a halt to man's inventive processes. At the same time, however, most agree that the ultimate solution must come from people working with people for the common good.

As we look into the future, there are exciting prospects for new innovations in transportation that will provide unlimited benefits and opportunities for everyone, young and old alike, not only to enjoy more goods, more leisure, and more travel, but they will be able to play an important and satisfying role in the development of that transportation system.

Our educational system is a ready made vehicle for understanding the complicated processes of transportation as well as developing the manpower, the technologies, and the policies that will be necessary for the planning, development, operation and control of a sort that brings technological "know-how" into harmony with human values.

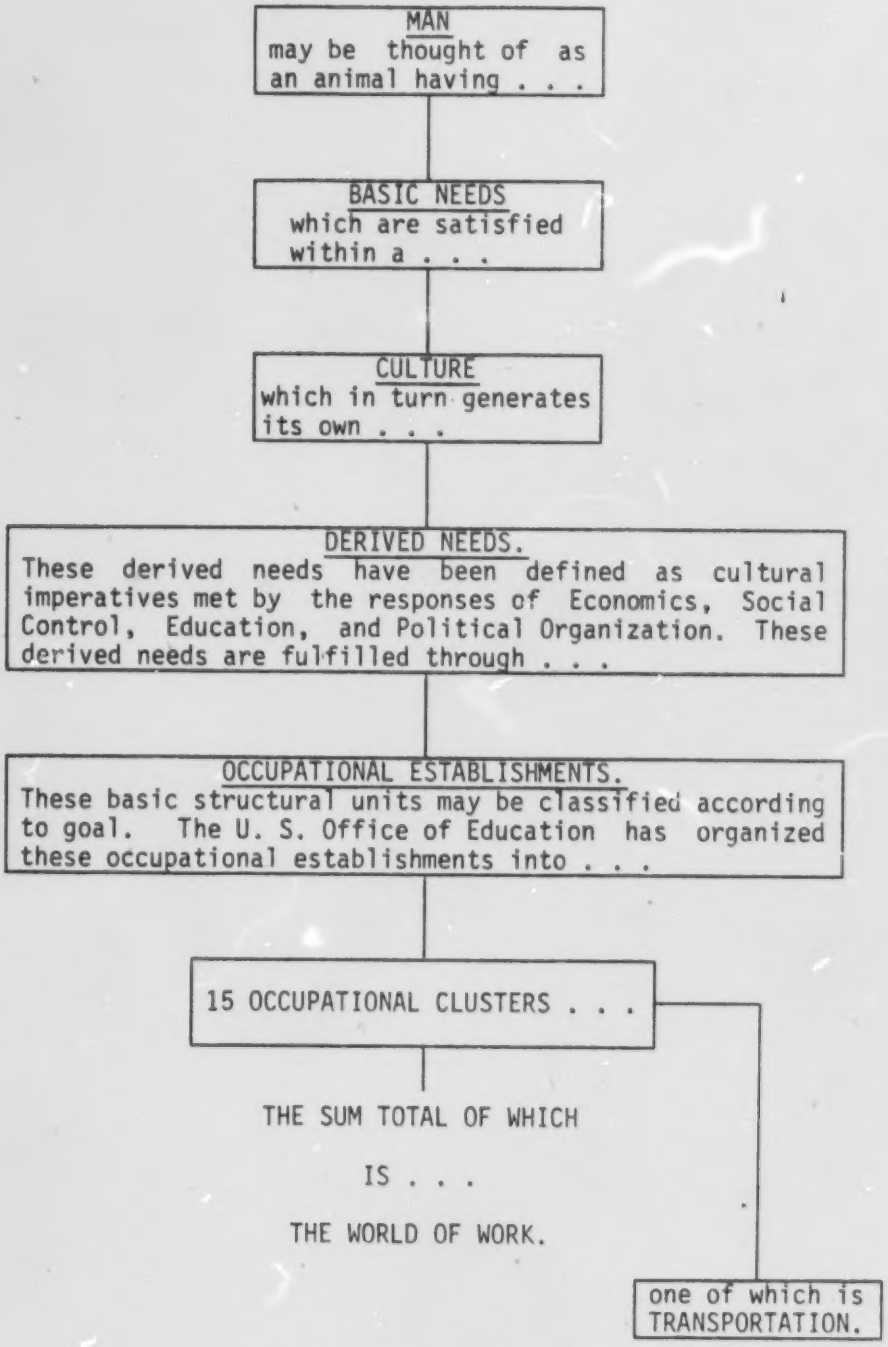
III

TRANSPORTATION IN THE WORLD OF WORK

One of the primary tasks assigned by the grant for this project is to "analyze and modify as necessary the Division of Vocational and Technical Education, U. S. Office of Education, tentatively developed occupational cluster, dated April 1, 1971, on transportation occupations" (DHEW Grant No. OEG-0-71-4691 (357), 1971, p. 3). The performance of this task requires classification of transportation occupations into occupational groups and job families enabling the provision of systematized data to the project staff that will be useful in developing curricula for the exploration of, and the preparation for, careers in transportation.

THE WORLD OF WORK

The project staff recognized the need for a model of the World of Work to provide a framework for organizing the world of transportation into a system that would lend itself to use in developing career exploration and career preparation curricula for high school use. Initial research provided many models that appeared to serve the purposes of separate parts of the project but only one that could be used for the entire project. The model of the World of Work adopted by the project is a combination of a number of models accomplished by research performed in an earlier career education curriculum development project. It appears on the following page in a form slightly altered from the original. The alteration was necessary to adapt the model to the purposes of the present project as well as to fit it into the U. S. Office of


MAN
may be thought of as an animal having . . .
BASIC NEEDS
which are satisfied within a . . .
CULTURE
which in turn generates its own . . .
DERIVED NEEDS.
These derived needs have been defined as cultural imperatives met by the responses of Economics, Social Control, Education, and Political Organization. These derived needs are fulfilled through . . .
OCCUPATIONAL ESTABLISHMENTS.
These basic structural units may be classified according to goal. The U. S. Office of Education has organized these occupational establishments into . . .
15 OCCUPATIONAL CLUSTERS . . .
THE SUM TOTAL OF WHICH
IS . . .
THE WORLD OF WORK.
one of which is TRANSPORTATION.

Model 1 - The World of Work

Education Career Education System of 15 Occupational Clusters. (The model and descriptions of its components have been adapted and summarized from William H. VanRooy, *A Conceptual Model of the World of Work*, Career Development for Children Project, Southern Illinois University at Carbondale, 1972. The reader is referred to this publication for further, and more complete, discussions of the model and its social-economic, behavioral and other implications. A soon to be published companion work, Kenne Turner, *A Theory of the Functional Self*, Career Development for Children Project, Southern Illinois University at Carbondale, 1973, may also be of value.)

The adopted model recognizes work from both an individual (self) and an occupational point of view indicating that curricula developed within the model will aid the prospective student in understanding work from both of these points of view and enable him or her to make valid occupational and career decisions.

Components of the World of Work Model

The word "man" used in the context of the model represents humanity rather than the individual. It is further limited to social-biological implications. This perspective looks upon humanity as being responsibe to the needs common to all life forms.

The "basic needs" in the model indicate those biological imperatives that govern humanity. To provide an example, a typical basic need is the metabolic one for nutrition.

Man's "culture" evolved as a response to his basic needs thereby providing humanity with what might be called a life support system. Within the culture, techniques are evolved for meeting man's basic needs. Continuing the example, certain techniques for obtaining food have evolved to meet the basic need for nutrition.

The cultural responses to basic biological needs lead to certain "derived needs" which are cultural imperatives (rather than biological imperatives as in basic needs) that are also common to all mankind. Returning to the example, the techniques that evolved for obtaining food led to a derived need for training in the proper use and application of these techniques. This training is just as necessary to human survival as is the obtaining of food itself; but it is less directly related to the biological need that underlies both.

The basic structures through which the derived needs of a culture are met are called the "occupational establishment." These structures are created by man for the purpose of satisfying culturally derived needs. In the example, the school could be considered as the occupational establishment created to train man in the proper use and application of the techniques for obtaining food.

The Occupational Establishment

The occupational establishment is the basic, goal-oriented social unit of the World of Work. It is a concrete structure based upon the assumptions that most human activity is purposeful, that this activity has an interrelationship within society and that humans are born or enter into previously formed traditional groups. The occupational establishment provides the "where we work" dimension of the World of Work into which can be fitted the "what we do" dimension.

The "people" referred to in the model (See Model 2) are all of the individuals who participate directly in the achievement of the goal of the establishment.

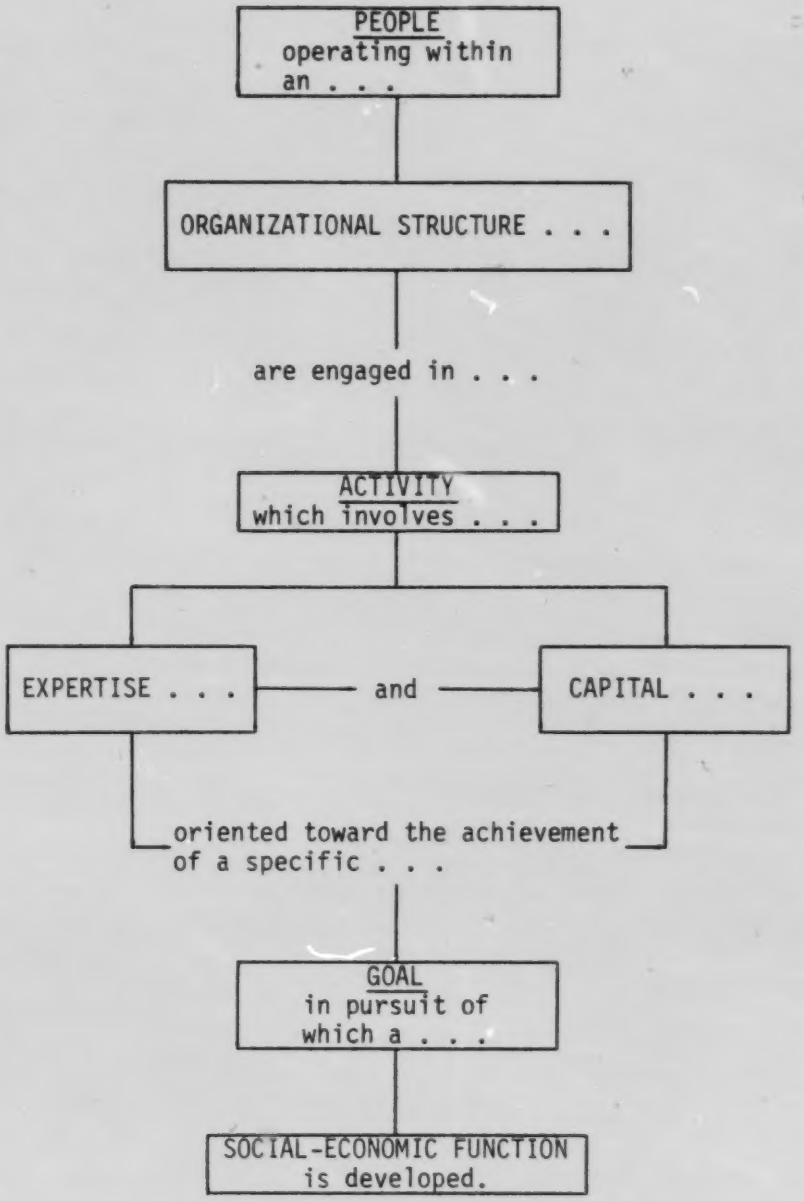
The "organizational structure" refers to the internal social system of the establishment. The patterns of human interaction within the establishment are both formal and informal and are pragmatically and traditionally developed. It should be noted that the formal patterns of goal achievement seriously limit the formation and development of the informal patterns.

The "activity" component is the work which takes place within the occupational establishment toward the achievement of the goal. This activity has two sub-components; expertise and capital.

"Expertise" is the application of the knowledge and skill necessary to goal achievement. This is the human element of the occupational establishment's activity; the "what we do" dimension.

"Capital" is used in its usual business sense and represents the real and potential material used within the establishment toward the accomplishment of the goal; the "what we do it with" dimension.

The "goal" is the primary justification for the creation of the occupational establishment. The goal is usually expressed in terms of the goods to be produced, or the services to be produced,



Model 2 - The Occupational Establishment

for society. The goal is the point of reference about which all of the other components of the establishment are organized. It should be noted that, as in other model components, the goal is oriented toward providing something for mankind. The profit motive is regarded not as the goal, but as a stimulus toward the goal.

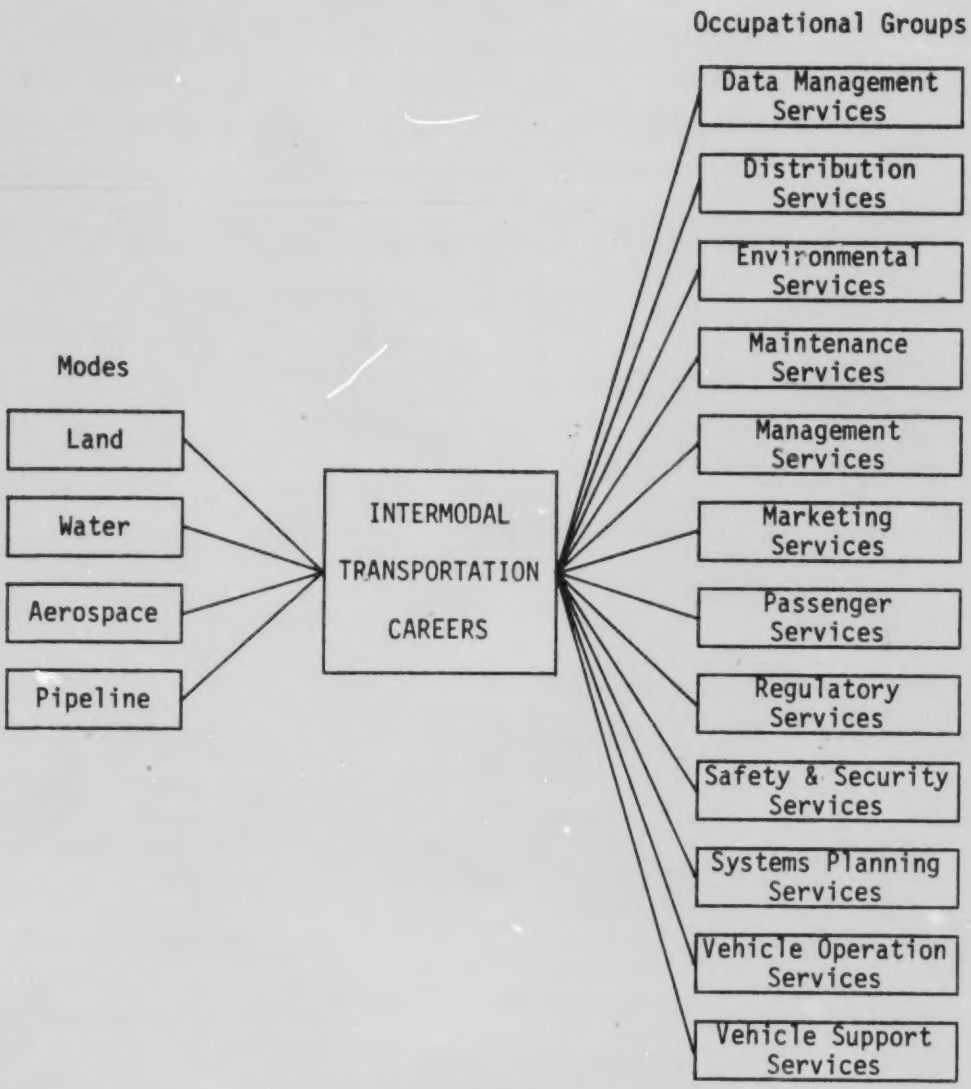
The "social-economic function" is the effect made by the occupational establishment upon the social-economic environment in which it exists.

In conclusion it can be stated that an occupational establishment is created by man to achieve a particular goal necessary to the functioning of the society within which it is created. The naming of a goal serves to identify and classify the occupational establishment. The U. S. Office of Education has organized all occupational establishments, by their goals, into a system of 15 occupational clusters. They are: Agri-business and Natural Resources, Business and Office, Communications and Media, Construction, Consumer and Homemaking, Environment, Fine Arts and Humanities, Health, Hospitality and Recreation, Manufacturing, Marketing and Distribution, Marine Science, Personal Service, Public Service and Transportation.

THE TRANSPORTATION CLUSTER

The analysis and modification of the USOE tentatively developed Occupational Cluster for Transportation began with a concern for both the "what we do" and the "where we work" dimensions of the World of Work. This led the project staff to an investigation of two kinds of occupational establishments. Initially those establishments whose primary goal is the providing of transportation services were investigated. This, in turn, led to an investigation of those establishments whose primary goal lies within the province of another occupational cluster but have transportation as an activity oriented toward the achievement of the primary goal.

The analysis and modification investigations led to development of the concept which the project staff has chosen to call Intermodal Transportation Career Education. This concept is the fusion of Career Education (which has been adequately elucidated in Chapter I of this paper) with the concepts of Intermodal Transportation and Intermodal Transportation Careers which will both be elaborated upon below.



Model 3 - The Transportation Career Education Cluster Organization Model

Intermodal Transportation is defined as the movement of people or goods from one place to another using more than one mode of transportation. Using this definition most trips can be classified as being intermodal. For instance, the trip to work in the morning — walk to the car, drive to the station, train into the city, taxi to the office, walk to the desk. Or oil from the North Slope — pipeline from the well to an ice-free port, ship to a coastal port, pipeline or tank car to the refinery, tank truck to the service station.

An Intermodal Transportation Career is defined as one containing job elements common to more than one mode of transportation. Thus, intermodal transportation skills are those which refer to occupational groups where job families can be identified and a ladder of progression or promotion is apparent, but where skills are not restricted to one mode or means of transportation. With minor modifications, these skills are common to several modes, are used by various carriers, and are present in the private and government sectors of the economy. For instance, dispatching knowledge and skills are concrete and it only takes minor modifications of these basic skills for the dispatching of airplanes, boats, taxis, buses, trains, etc.

These definitions, and the concept of Intermodal Transportation Career Education, have led to the identification of twelve major occupational groups and sixty-one job families within the Transportation Career Cluster. Model 3 shows the fusion of the four major modes into Intermodal Transportation Careers and the subsequent breakout into the twelve occupational groups. The job families are shown in the models included with information on each occupational group in the following chapter.

IV

THE TRANSPORTATION CLUSTER

The purpose of this chapter is twofold. First, it is intended to provide technical data from the world of transportation and its twelve occupational groups, for the project staff, consultants and others, that will facilitate curriculum development. Secondly, it will provide technical background and resource material to the teachers who will implement transportation career education programs.

The Transportation Core

The necessary technical data and background material for the world of transportation has been provided in Chapter II of this paper. Educational requirements required for entry into careers in transportation will be set forth in this section on The Transportation Core.

There are certain common elements which can be organized to help students develop skills, knowledge and the necessary attitudes for entry into transportation careers. Such elements will be involved with *all* careers in transportation. Together they make up what is called *The Transportation Core*.

It should be noted that the elements of the basic transportation core outlined in this section refer to areas of knowledge rather than to specific courses. It should also be noted that these elements can be skills, knowledge or understanding; they do not involve skills alone.

Since these elements generally are self-descriptive and involve terms that are well understood, no effort is made to explain them in the summary that follows. In the development of this program it must also be recognized that basic communication skills (reading, writing, basic mathematics, etc.) are considered essential for success in any transportation career. As a result, they are not included in the core program given in this section.

Elements of the Basic Transportation Core

Communication Systems

Communication Skills

Management

- Employee responsibilities
- Supervisory responsibilities
- Corporate responsibilities
- Collective bargaining
- Performance standards
- Cost effectiveness factors

Job Management

- Independent activity
- Logical and incremental planning

Geography

- Transportation networks
- Population networks
- Demography
- Economic Geography

Economic Systems

- Impact on workers
- Limitation of resources
- Management of resources (air, land, water)

Safety

- Job safety
- Personal safety
- Public safety
- Occupational health and safety

Security

- Personnel
- Property

Transportation Modes

- Transportation systems
- Future systems
- Transportation technology

Regulation

- Regulatory agencies
- Law - domestic
- Law - international

Environment

- Monitoring
- Planning factors

Human Relations

Pre-Employment Orientation

- Opportunities for advancement
- General working conditions
- Job requirements
- Hazards and constraints
- Salary levels
- Specific job functions

Socio-Cultural Impact

- Impact of transportation on society
- Impact of society on transportation

Marketing Transportation Services

- Transportation carriers
- Transportation travel agencies
- Market Research

Suportive Business Services

- Record keeping
- Financial records
- Organization and finance
- Management information

Computational and Mathematical Skills

Weights and measures
Problem solving techniques in transporation
Calculating devices
Applied physics

The Occupational Groups

The purpose of this section is to provide technical data and background material for each of the following occupational groups: Data Management Services, Distribution Services, Environmental Services, Maintenance Services, Management Services, Marketing Services, Passenger Services, Regulatory Services, Safety and Security Services, Systems Planning Services, Vehicle Operator Services and Vehicle Support Services. The total structure is shown in Model 3 for reference.

Each occupational group begins with a general introduction, a model of the group showing its member job families, a definition and a scope. Headings such as the group's relationship to society, the core of knowledge required of workers in the group, career lattices and recommended related courses follow.

Perhaps the most important point to be made is, that even for the person who may be seeking information about only one of these occupational groups, there will be considerable value involved in reading the others as well. The material on the various occupational groups was prepared by different people.

There are two other topics included with each occupational group which are deserving of special mention.

One of these has to do with recommended related courses. While applicable to all, the courses listed under this heading will be of especial interest to teachers and students in small or intermediate sized secondary schools where special training in the occupational group involved will not be available. These are the courses which will be particularly useful to the student planning to prepare for a position in a particular occupational group before he actually undertakes training specifically oriented toward that group. That is, there may be a student in a small high school who plans to engage in an occupation for which specific job training courses are not available in his school — but these related courses will be ones that will provide a sound basis for later entering upon that training, either formally or on-the-job.

With regard to any specific job, not all of the courses listed under this heading will be appropriate. The student should select courses from this list according to the specific job which he has in mind. At this point both his teacher and counselor can be of real help in his selection of the most appropriate courses.

There is also mention in these occupational group summaries of opportunities available for the culturally disadvantaged, the physically handicapped, and members of minority groups. It is heartening to note that opportunities exist in all of these occupational groups for which such persons may be trained, and that in many of these their initial disadvantages may be of little consequence whatever.

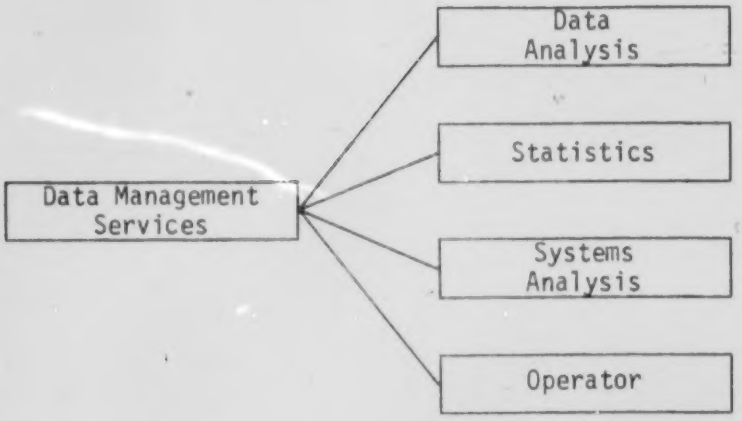
DATA MANAGEMENT SERVICES

Data management is a vital and integral part of the American transportation and distribution system. Large numbers of people are currently employed in transportation data management and the demand for qualified personnel will increase as the level of sophistication of data processing equipment grows. The business world is becoming increasingly complex, requiring more and better information. This information can be manipulated in many ways and is convertible into different forms and formats.

The management of data in transportation and distribution is as crucial as in any other area of business, especially because of time consideration and the need for efficient utilization of transportation systems. Examples of unique data management include railroad car control and airline reservations. These activities must be carried on in a real-time mode. (Real-time means that the data is processed simultaneously with the event generating the data.)

The potential of transportation data management in terms of both job opportunities and the more efficient movement of goods and people is enormous. Future technological developments will create new jobs and new opportunities to provide better transport service.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this cluster are by no means the exclusive property of any one occupational group. This will be as true of this occupational group as it is of the others in the cluster, and it should be kept in mind as one reads the outline of Data Management Services which follows.



Model 3a - Data Management Services Occupational Group

DEFINITION

In connection with this occupational group, data may be defined as items of information. Thus, data management is the collection, recording and manipulation of these items of information.

As a result, persons employed in data management services collect data; they record it; they analyze it; they store it; and they retrieve it and, if necessary, convert it to a form suitable for presentation to others.

It is extremely rare that any one individual will be concerned with all, or even most, of these processes. As instances of this, employees in this field may perform such specialized functions as that of a keypunch operator, data analyst, computer tape librarian, or computer operator.

While the definition of this field has not changed substantially in recent years, the kinds of positions within it have undergone substantial changes. These changes are the result of rapid developments made in the data processing field, particularly with regard to computers. Certain of the most important jobs in this field today did not exist to any degree at all twelve or fifteen years ago. (The position of computer programmer is an outstanding instance of this.)

It would be a mistake to think of positions in this occupational group as being limited to computerized data processing. There are openings in this field for data clerks, analysts and statisticians. However the greater number of positions in this group now do involve computerized data processing and it is possible that even more openings in the years ahead will be on an automated level. This means that one literally cannot think of data management services in transportation without giving important regard to the computer.

SCOPE

All business enterprises are dependent upon the efficient flow of data, both internally and externally. Accurate, prompt and complete data is essential to the decision-making processes of all businesses. External data flow refers to the exchange of information between the business firm and its vendors, customers, the government and the public. Some examples of this are sales orders, passenger reservations, earnings reports, tax reports and reports to vendors. Examples of internal data flow, which takes place within an organization, are payroll reports and checks, bills of lading for shipments of goods, employee time schedules and stockholders reports.

All data which is processed by a firm, whether internal or external, goes through the three-step data-input, data-processing and data-output cycle. Data input involves the conversion of data from source documents to a form acceptable for processing by a computer or another means. Source documents are the original records of some internal or external transaction, such as payroll forms or customer orders. These records are often written in longhand and must usually be transferred to punched cards for entry into the system. Some occupations which are involved with this phase of the three-step cycle are Input-Output Control Clerk, Keypunch Supervisor, Tape Librarian and Keypunch Operator.

Data Processing is that stage during which the data is changed in form, order or structure to increase its value and utility. Sales orders for the year might be totaled. A sales commission might be computed. Available seats on a particular flight might be determined. Data is generally stored during this stage for later retrieval. Data processing occupations might include the Computer Operator, Programmer, Computer Scheduling Supervisor, Manager of Computer Operations and Data Processing Manager. In the data output phase, results of the two previous steps are

made available in various forms, to persons within and without the business firm, to be used in a variety of ways. The data has little value until it is communicated to the potential user in a language he or she understands. Output actually consists of printing forms, statements or reports or displaying results on some electronic visual device. The occupations listed under input and processing also participate in the output phase of the data cycle.

A number of occupations within the scope of data management do not directly participate in the data cycle's generation of information. These occupations (Systems Analyst, Systems Manager, Data Processing Manager, etc.) are involved with the overall strategies for using data management to effectively and efficiently process information.

The data cycle goes this way: clerks in various departments enter data onto forms, which are checked for accuracy, balanced and then sent to a data entry department for conversion to machine readable format. Computer operators process this information on computers, which generate results in the form of reports or statements. These reports are submitted to other departments for information purposes and use in decision-making.

Whenever report requirements change, when new ways of assembling data are needed or when information is generated requiring new forms of entry or reporting, systems analysts visit the various departments to work with departmental staff in developing improved or new methods of generating and reporting data. Entire systems might be revised or reworked for various reasons (usually efficiency or accuracy) by systems managers or data processing managers.

Persons who enter the data management group should possess analytical minds which enable them to reason problems through from beginning to end, considering each step in relation to its logical position in the overall framework of the problem to be solved. Desirable attributes include the ability to communicate effectively with fellow employees; an ability to concentrate for long periods; the possession of a good memory; the ability to get along with others and an interest in problem solving. The indoor and sedentary nature of most data management positions makes this field a good one for persons who are handicapped physically.

Data management occupations will provide much pressure to get the job done against continual deadlines and can involve long hours of work beyond the normal eight hour day. Newer and more efficient equipment and more effective utilization of data

management require continual study and updating of skills and knowledge on the part of data management employees.

Conditions in this field include well-lighted, air conditioned and relatively quiet working areas. Some jobs require persons who are able to take orders and some require persons able to give orders. Sometimes working on an entire project alone is required. What is not required is that one have a direct initial interest in transportation in order to obtain employment in transportation data management. However, it is desirable, if not required, that an interest in transportation systems is generated once a person has begun working in this occupational group.

Rewards are numerous in data management. They include better than average salaries and working environments, excellent opportunities for advancement and satisfaction that one is doing important work.

SOCIETY AND DATA MANAGEMENT SERVICES

As has been noted earlier, data management is a vital and integral part of American transportation. As is true with many other fields, however, attitudes of others toward data management tend to be somewhat complex. This will be true both of people within transportation itself and those who come in contact with these services in the role of consumers.

Much of this complexity is due to the fact that increasingly, data management in transportation has become "automated." This means that machines have taken over certain functions formerly performed by humans, and persons still in the field have sometimes found their responsibilities altered. The consumer of transportation services will often find that in dealing with a particular company, he seems to have become simply the recipient of computer printouts and is identified on company records solely by a "consumer number."

As a result, the increased speed and efficiency which automation has brought to data processing has sometimes been seen as being accompanied by a dehumanization of services as well. People who work in data management services have to bear the brunt of this complexity of attitudes.

On the other hand, people who work in this field have job security, earnings that are usually above the average and the respect that often attends those who work with the "computer mystique." People in this group are often seen as riding the crest of a wave; this has the additional requirement of meaning that people in data management have the responsibility of keeping abreast of a rapidly changing field.

All in all, these circumstances mean that data management today is a prestigious, well paid and demanding field.

DATA MANAGEMENT CORE

The elements listed below are those common to all jobs in data management services. This means that they should be part of the curriculum for any person preparing for any job in this occupational group:

Information Gathering Techniques

Sources of Data

Statistical Analysis Techniques

Sampling, Variance, Standard Error

Data Collection Techniques

Recording Techniques

Data Analysis

Data Presentation Techniques

Knowledge of Transport Operations

Data Storage Technique

Computer Capabilities and Potential

Interpretation of Computer Data

Systems Analysis

CAREER LATTICES

Any career lattice for data management personnel will usually progress from a data clerk thru to the data processing manager. However, the path from one to the other will vary somewhat from case to case. This practice is common in transportation the same as it is in other industries.

Examples of simple career lattices in this field are:

Key Punch Operator

Input Output Control Clerk
Key Punch Supervisor

Input Output Control Clerk

Tape Librarian
Computer Operator
Lead Operator
Shift Supervisor
Computer Scheduling Supervisor
Manager of Computer Operations
Data Processing Manager

Computer Operator or Lead Operator

Programming Trainee
Junior Programmer
Programmer
a. Senior Programmer
b. Systems Programmer
c. Software Specialist
Project Leader of Programmers
Programming Manager
Data Processing Manager

Programmer

Junior Systems Analyst
Systems Analyst
Senior Systems Analyst
Systems Project Manager
Systems Manager
Data Processing Manager

RECOMMENDED RELATED COURSES

Elementary Typing — Operation, use and care of the typewriter. Typing by the touch system, emphasizing basic typing problems. Drills for speed and accuracy building will be used throughout the course.

Intermediate Typing — Development of production work in typing manuscripts, business letters, forms and tables.

Fundamentals of Speech — Theory and practice of oral communications. Development of poise, confidence and skill in speech organization and delivery. Emphasis on frequent speaking, development of standards of criticism, and selection and organization of materials.

Elementary Algebra — Signs, symbols, and operations needed for other courses in mathematics and science are introduced. Basic topics include: introduction to sets, signed numbers, linear equations, exponents, polynomicals, factoring, graphing, and quadratic equations.

Geometry — Concepts and constructions of plane geometry including lines, angles, polygons, circles, and loci, with an introduction to coordinate geometry. Equivalent to one year of high school geometry.

Fundamentals of Mathematics I — Sets, number bases, number systems, review of selected topics in algebra and geometry. A general education course in mathematics.

Fundamentals of Mathematics II — Continuation of Mathematics I with emphasis on topics usually covered in Intermediate Algebra. Nature of roots of quadratic equations, complex numbers, rational exponents, radicals, logarithms, inequalities, binomial theorem.

Introduction to Data Processing — The history of data processing, scope and significance of data processing, mechanical data processing, punched card unit records, punched card machine functions and electronic data processing equipment.

Business Record Keeping — Standard bookkeeping procedures for small firms, both business and professional. Journalizing, posting, and preparing trial balances and financial statements. Procedures for handling petty cash and bank deposits and withdrawals.

Introduction to Business Organization — Nature of business and the environment in which it operates. Forms of business ownership; introduction to operative and facilitating facets of business operation; management, marketing, accounting, statistics, business law, finance, investments, insurance, and labor-management relations.

DISTRIBUTION SERVICES

Transportation services, including the physical movement of materials and goods from origin to destination, account for twenty percent of the gross national product. From the standpoint of the shipper or user of transportation, this includes selection of the appropriate carrier, mode or group of modes and transportation equipment; freight rates or other costs of transportation; and transit times as well as the capability of transportation modes to move the product safely, dependably, and at a reasonable cost.

The industrial term "distribution" includes transportation but, in addition, it embraces related functions and the methods by which materials and products are physically handled when being moved from source to destination, including "in plant" materials handling.

Certainly levels of inventory, warehousing, and customer service (as it relates to the delivery of products) are included in distribution.

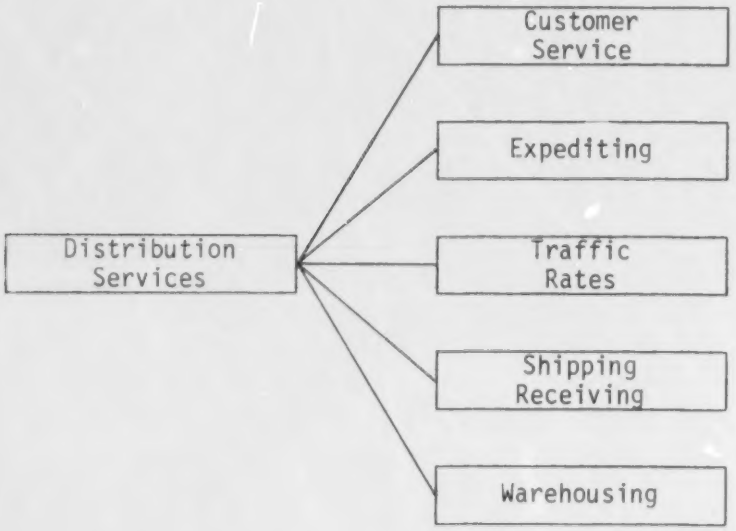
This occupational group needs individuals with training in the specialized areas enumerated in the basic core for transportation as well as additional specific skills and knowledge. To move up the occupational ladder, individuals placed in entry jobs must acquire a knowledge of other jobs in distribution and in other areas as they interface with the distribution department.

Transportation distribution services include jobs involving "users" of transportation (shippers) as well as jobs with the various carriers involved in intermodal transportation. Jobs dealing with passenger movement, even in priority transportation,

have been determined to be incompatible with those involved exclusively with the movement of goods. For this reason such jobs have not been considered within this occupational group.

Some jobs in this group would appear to have especial growth potential, both in numbers of opportunities and possibilities for advancement. These include jobs involved with freight rate analysis, inventory control and customer service.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this group are by no means the exclusive property of any one occupational group. This will be as true of the others in the cluster, and it should be kept in mind as one reads the outline of distribution services which follows.



Model 3b - Distribution Services Occupational Group

DEFINITION

People who work in this field aid and assist in the efficient movement of property — internally, externally and through a given facility.

Functions included in this occupational group include the receiving of property for shipment, the dispatching of goods and the expediting of their movement, decisions concerned with freight rates, and warehouse management and inventory control.

SCOPE

Because of the broad variety of jobs included in this occupational group — ranging as they do from customer service representative to warehouse specialist, from dispatcher to expediter — conditions of employment in this field will also vary considerably from one kind of job to the next.

However, one generality that can be made is that distribution services positions are mostly action jobs. In addition there is a high degree of job interaction and interdependence within these services. One is almost constantly in contact and communication with other people. This means that an essential requirement for persons employed in Distribution Services is the ability to work and communicate effectively with others, sometimes in fairly competitive or deadline-oriented circumstances.

Because of the peculiar requirements of this field, a multiplicity of talents and personality characteristics are not only desirable but needed to work in this occupational group. The following deserve special mention: above average memory, competitive spirit, enthusiasm, self-discipline, group consciousness, initiative, innovativeness and manipulative ability.

Employment in distribution services is year round. The variety of jobs offered are available indoors, outdoors or in combination. Jobs involved in a noisy environment include those of the freight inspector, shipping/receiving specialist and the warehouse specialist. The freight claims analyst, freight rate analyst and inventory control specialist work in a quiet environment.

Jobs in distribution services may be found in all regions of the country, in major cities, and in smaller towns.

Opportunities for handicapped persons are available in this occupational group. (For instance, as freight claims analyst, freight rate analyst, and inside customer service representative.)

All jobs in this group have a commonality of employment satisfactions. They are: awareness of contributing to a team effort, daily challenges, opportunities for contacting people beyond the company perimeter, job uniqueness within the company employment structure, and job security.

SOCIETY AND DISTRIBUTION SERVICES

Because of the dependence of one specific job upon another in this group a person-to-person relationship exists among people who work in distribution services. Contacts with other occupational groups within the company are constantly necessary. This means that people working in any of distribution services have remarkably high visibility to other occupational groups and, ont infrequently, even to top management.

These may be described as "firing line positions." As is frequently true with such jobs, ability to produce is well recognized, and this often enhances an employee's opportunities for promotion and advancement. Possibilities for transfer to other departments will also be better than average.

However there is another side to the coin of this circumstance. Because of being on the firing line and possessing high visibility, persons employed in distribution services may be as readily blamed as praised. When something goes wrong — for instance when any property does not reach its destination on schedule or is misdirected in transit — the person employed in distribution services may well be held responsible.

This may be as true with persons outside the company as those within it. The general public usually deals with a representative of distribution services in the shipment of goods. When members of the public have something go wrong in this process, they are likely to be told that someone within distribution services must be at fault. Thus, people working in distribution services must be willing to face criticism, often regarding circumstances over which they themselves actually have no control.

It is likely that the general public sees distribution services as the very core of any company in the field of transpor-

tation or of any transportation system. This involves considerable status, but also means that distribution services may be held responsible for the ills of an entire transportation system.

DISTRIBUTION SERVICES CORE

Unique characteristics of different jobs in distribution services almost preclude the development of a core of elements for all jobs included in this area. However, there are certain elements which do appear to be common to all the jobs in this occupational group. These will involve an understanding or knowledge of:

Geography

Transportation Regulations

Specific Transportation Systems

Principles of Marketing

Psychology of Human Behavior

CAREER LATTICES

Career lattices within this occupational group are especially apparent as one examines the job titles involved. Within jobs having multiple levels, vertical mobility is encouraged and made possible through the identification of a progression of educational elements indicated. The jobs included in this occupational group are much more independent of one another in the duties performed than most jobs included in the other groups. In spite of this independence, some lateral mobility is possible.

For example, over-the-road equipment operators may move to dispatcher positions and freight claims analysts may move into the higher levels of freight rate analysis. The freight analysts can, either beginning at the bottom of that job area or having moved into it from other jobs, work upward into very responsible jobs.

Furthermore, freight rate analysts, as well as inventory control specialists, customer service representatives, expediters, and warehouse specialists, can look forward to opportunities for promotion and advancement to such positions as general traffic manager, director of distribution, vice president-traffic, vice president-distribution. The expeditor, or person who is responsible for the continuing movement of a product to the consumer, must seek out the mode or modes of transportation selected and direct prompt movement of the product. In this instance, an example of lateral mobility may be the expeditor to the customer service representative.

Though the freight inspector may be the lowest job level in this occupational group, it is highly possible that the freight inspector may move to shipping/receiving specialist, and the shipping/receiving specialist may move in many directions within transportation distribution services.

MISCELLANEOUS INFORMATION

At the high school level, many communities offer a cooperative placement program developed between school and industry, mostly during summer months and some for after school part-time. Various modes are contacted by a questionnaire letter requesting the kinds of jobs available, work description, hours and pay. Job seekers in high school may be employed in the shipping/receiving department of an industry as manifest typist or as a filing clerk in a traffic department.

Teachers in public and private schools, including counselors, should have a better understanding of transportation distribution services. More summer cooperative programs should be developed between universities offering graduate credit, public and private schools and local industry to hire teachers-counselors. Assignments to jobs within transportation distribution services would be voluntary but included in the occupation listings. The teacher would receive a stipend from the industry.

In many geographical areas, courses for non-college students are sponsored by vocational organizations at a vocational school or community college facility. The student is awarded a certificate when successfully completing each course.

College and non-college students may enroll in Interstate Commerce Commission practitioner courses usually offered by community colleges, universities or extension divisions in preparation for certification. Upon successful completion, the student is certified to practice before the Interstate Commerce Commission with a Class "B" license. This certification would be helpful to the traffic manager.

Another certification program has been established by the American Society of Traffic & Transportation, 22 W. Madison Street, Chicago, Illinois, 60602. While this program demands a high degree of academic achievement it is most valuable as a qualification for upward mobility in distribution services. There are four study guides containing preparatory material for certification examinations in:

Economics of Transportation

Transportation, Traffic and Physical Distribution

Management Tools & Concepts

Transportation Law and Regulation

These study guides are available from AST&T at a cost of $5.00 each.

College and non-college students should consider membership in Delta Nu Alpha Transportation Fraternity, Inc., 15017 Detroit Avenue, Cleveland, Ohio, 44107. This national transportation organization with 200 chapters located throughout the country provides a base for individual members to solve common problems. The organization is transportation education oriented and membership includes people in many job levels in the transportation industry. A variety of meaningful transportation education programs are presented each month by the chapters. Many chapters sponsor a wide range of courses at the community college level in addition to conducting group study in preparation for I.C.C. Practitioner and AST&T examinations. Speakers for high school career days are furnished by chapters and also instructors for varied transportation courses at the vocational school level. Many other traffic and transportation organizations at the local and national level provide similar services. These organizations may be contacted at the local level for information about meetings, course sponsorships, and for resource speakers.

In the jobs identified with distribution services, the freight inspector and shipping/receiving specialist would not need special training except where personal motivation for advancement exists. Technical and academic training are recommended for customer service representative, expediter, freight claims analyst, freight rate analyst, inventory control specialist, and warehouse specialist.

RECOMMENDED RELATED COURSES

At the high school level, the following appropriate related courses are recommended:

Business Mathematics
Basic Statistics
Engineering Concepts
Writing
Speaking
Listening
Bookkeeping
Typing
Business Law
Engineering Drawing
Electricity-Electronics
Metals
Auto-Truck Mechanics
Shop Foreman

It is assumed in most instances that required courses for high school graduation are completed with recommended related courses. Where these recommended related courses are not available, the vocational, technical or trade schools do offer most of these courses and many on a year-round basis in cooperation with local school systems. Also, many grant high school credit.

ENVIRONMENTAL SERVICES

Transportation has a great impact upon the environment. Government, the transportation industry and educational institutions agree that this will result in increasing job opportunities, reflecting this impact and the widespread concern about it.

It is still difficult at this time to assess the full extent to which new career opportunities will develop or the precise forms which they may take. Environmental services is new to transportation. It is so new that quantitative projections are extremely difficult.

Even the names under which the careers projected in this group will finally emerge is only conjecture at this time. While some of the functions referred to here already exist in industry or government, they also occur as parts of existing programs, and the extent to which they will emerge as independent entities — or the form in which they will do this — is difficult to foresee. Also, certain functions involved with transportation environmental services overlap with various other occupational groups (For example; Safety and Security Services, Regulatory Services, and Systems Planning Services.)

Since environmental careers cannot be as precisely defined as most other careers, it becomes difficult to describe specific job elements, appropriate training levels and career ladders in the most desirable way.

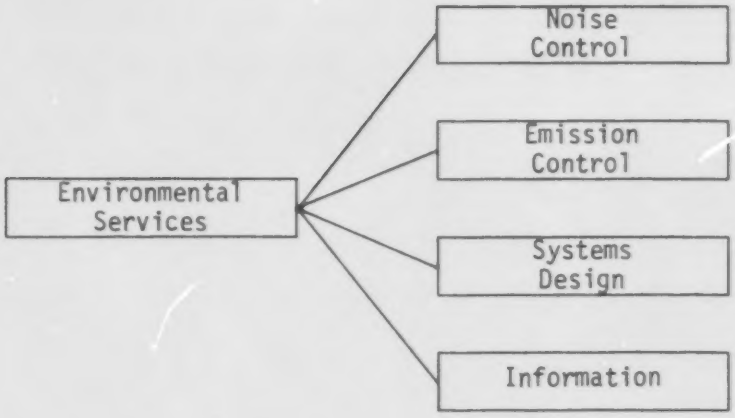
This summary, however, does attempt to predict the important occupational areas that may develop, the forms they will take, and the jobs that will be involved with them.

While we are concerned here with environmental careers within transportation, it should be noted that there are many jobs within the environmental field that are directly concerned with transportation. In the development of specific curriculum objectives and materials this interrelationship should be capitalized upon to every possible extent. (For example; maintenance of vehicle emission control devices is a concern of both fields. The specified skills involved and curriculum development are the same for both fields)

The most important aspect of environmental careers within the transportation cluster is that every specific job has its environmental aspects. This means that basic transportation core curriculums must reflect this environmental awareness; it also means that all persons in career areas within this group must develop environmental awareness and decision-making skills. (For example: A top level manager cannot locate new facilities without assessing the environmental impact of his actions. He must not only be aware of this need but have sufficient knowledge and skills to determine the answers; or at least ask the right questions.)

Even though specific environmental jobs are not easily identified at this time, the development of a basic environment curriculum to produce skills, knowledges, and attitudes for all other career areas is vital.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this cluster are by no means the exclusive property of any one occupational group. This will be as true of this occupational group as it is of the others in this field, and it should be kept in mind as one reads the outline of Environmental Services which follows.



Model 3c - Environmental Services
Occupational Group

DEFINITION

This group includes those occupations charged with the responsibility to minimize the adverse environmental effects of transportation activities while also considering the efficient utilization of allocated resources. Training for this occupational group requires both specialized skills and a broad general education.

Within this area of the transportation cluster the number of specific jobs will always be small relative to other groups such as finance, marketing, etc. However, the skills, knowledge, and attitudes involved in this group will form an increasingly important part of the decision-making process in all job areas of the transportation industry. (For example: A maintenance engineer's job will require the specific skills required to install, maintain, and repair pollution control devices; and a marketing manager concerned with distribution facilities will need to evaluate environmental effects based on information far beyond mere economic benefits)

SCOPE

The present growing concern of society with environmental quality provides this group with inherently positive aspects. While psychological satisfaction is not a complete substitute for financial rewards, the positive society image of environmental activities does help offset the income differences found in state and local government jobs within this group. Private industry as yet does not have enough specific jobs solely dedicated to environment to provide a good income profile, but the standard pattern of higher private industry salaries will most likely hold.

In general, the personal qualities and characteristics required for effective work in environmental services are no different than in any other job situation. Certain personal qualities such as ability to work with others are always valuable to any career. Certain types of environmental work such as within measurement and testing laboratories require physical dexterity while public contact work stresses more the ability to communicate. Employment is year-round and will be indoors or outdoors, noisy or quiet, depending upon the specific job.

The most critical characteristic for all environmental work, whether technician or transportation planner, is a holistic view of the environment. Skill in a very narrow speciality without an understanding of the interrelationships involved can lead to difficulties and certainly limits the individual. The ability to move horizontally between specific environmental jobs is just as important as the skills required to move vertically in a given occupational ladder. Within the technical areas of measurement, control, and regulation, this ability to move horizontally is critical due to the rapidly changing "state of the technical arts."

As a result, guidance activities and curriculum development both in career awareness and job preparation must develop an environmental awareness with its interdisciplinary mix of knowledge, skill, and attitudes for all transportation careers. In addition, the preparation of in-depth skills for a specific environmental job must anticipate mobility in both a horizontal as well as vertical direction.

SOCIETY AND ENVIRONMENTAL SERVICES

The positive view of society toward the environmental services occupation group has already been mentioned. This aspect

will provide positive motivation toward learning as well as toward actual job activity. Environmental services at all levels provide contact both directly and indirectly with society and even more importantly has a direct effect upon the "quality of life."

Within the more established occupational groups, the societal opinions and effects of environmental services are most closely related to those in the safety services group. Monetary rewards are dependent — as in any other occupation — upon specific jobs, employer, and location. Specific income ranges have been determined for a number of environmental jobs, but no study has been found that relates to the specific area of environmental services within transportation.

ENVIRONMENTAL SERVICES CORE

The elements listed below are those common to all jobs in environmental services. They should be a part of the curriculum for any person preparing for any job in this occupational group:

Basic Pollution Types

Basic Pollution Facts

Protection of Wild Life

Resource Management and Land Use

The Man/Ecology Relationship

The Technology/Ecology Relationship

Industrial Economics

Local, State and Federal Regulations

Community Development

Public Information

POSSIBLE JOB OPPORTUNITIES

Noise and Emission Control

The majority of jobs in noise and emission measurement and control activities will be in the public area. Governmental controls and their enforcement will require support staff at all levels, but individual private organizations will not do the development or design of pollution control equipment. However, as the need for noise control and use of specific pollution control equipment increases, larger industries will begin to develop specific job requirements. Increased regulations and environmental concern have initiated the environmental monitor function which will represent the major job area in the private sector.

Pollution Control Specialist

This may be either a general category or a specific specialization (such as air pollution control, solid waste control, noise control, or space and visual pollution control). In either case, emphasis is on technology and required skills are mostly in the "hard" science areas.

Pollution and Noise Abatement Technician

This career area may also be either general or specific. Skills are highly technical in nature and require more specific "hands-on" or psychomotor capacities than the control specialist. Skills in this area are highly subject to change as a result of technological advancement.

Waste Control Technician

This career area is directly linked to specific transportation modes. The level of skill is directly operational in nature, but the training should still include an understanding of environmental interactions and controls.

Environmental Monitor

This career area will be very similar to the safety inspector. This job will require the technical ability to determine whether or not pollution control equipment and procedures are being used and operating correctly.

Systems Design

The entire systems design area within transportation environmental services relates primarily to the public sector. Government agencies at all levels are being required to prepare environmental impact statements, and to include environmental effects in their operational planning. As a result, a growing number of jobs will develop requiring both specialized skills as well as a broad environmental awareness.

Within the private sector, these job areas will exist within only a few large systems. As environmental impact statements and analyses are required of a particular transportation industry, either the professional associations or private consulting firms will provide the information.

In the case of companies with a vice president or other corporate officer designated with an environmental title, the position will be filled by a lateral transfer from another career field unless an entire department is formed.

Environmental Systems Design Specialist

This career area requires the broadest and most comprehensive environmental training. Emphasis must be in both the physical and social sciences. Skills in measurement are less important than the knowledge of what to measure and how to utilize information in unique situations. Within this general area specialists exist for each area of pollution.

Pollution and Environmental Analyst

This career area also operates in both the physical and social sciences. Systems planning requirements range from the specific control device to the long-range economic impact of an entire transportation innovation. A single individual would specialize in a specific area such as control devices. Technological advances have less effect on this area than the control technicians.

Environmental Data Support Services

This career area operates in both physical and social sciences generally with specific skill areas involved such as interviewer, statistician, laboratory technician

Information

The public information area is most strongly related to the private sector and represents the greatest job volume in that sector. Since only the larger organizations will have full time assignments in this area, persons entering this area will transfer laterally rather than progress through an environmental services career ladder.

Information Specialist

This career area requires physical science understanding, but primarily emphasizes the social sciences, The ability to communicate technical information to non-technical audiences as well as the ability to interpret public desires and needs are the most important characteristics of this area.

Instructional Specialist

The requirements of this career area are similar to that of the information specialist with a stronger emphasis on the development of in-house environmental information needs.

CAREER LATTICES

Within the three transportation environmental service areas listed — Noise and Emission Control, Systems Design, and Information — progression would be vertical from a specific skill such as monitoring air pollution control equipment operation to the more general capabilities of monitoring equipment. The career lattice progresses from a specific skill or set of skills to general application. Rather than progress deeper into an ever narrowing specialty the environmental field requires a broadening of capability as well as increased specific skills.

For this reason, the broad environmental awareness base is necessary for all areas in this occupational group. If this base is provided, it will serve two important needs — first, provide the ability for future vertical advancement; second, increase the possibility for horizontal transfer when a specific job skill is eliminated due to technological advances.

RECOMMENDED RELATED COURSES

In order to provide general environmental skills, knowledges, and attitudes a broad development is necessary. Almost all existing formal instructional programs provide the basic skills and knowledges necessary. Two serious problems exist: first, curriculum is structured in a vertical fashion with each discipline isolated from the other; second, positive attitudes are more often destroyed than they are created. In order to provide the basis for environmental careers, the individual must be provided with a means (whether in or out of the formal educational structure) for cutting across discipline boundaries and relating formal curriculum elements to environmental skills and knowledges.

Activities such as the President's Environmental Service Awards Program, Environmental Projects within the Community, Environmental Simulation Games and other similar activities are necessary when the school itself has not yet developed an interdisciplinary approach to learning. Involvement in some of these activities will also be the process for developing the attitudes necessary for environmental careers.

Formal courses of instruction for general environmental areas include:

- Basic Science (preferably an integrated science course)
- Psychology
- Sociology
- Economics
- Political Science
- History - art and cultural
- English
- Communication Arts
- Law

Specific career needs in various job areas can be prepared for through:

- Mathematics
- Physics
- Meteorology
- Chemistry
- Mechanical Shops
- Engineering Drawing

MAINTENANCE SERVICES

Transportation has been called the key to civilization and progress. No mode of transportation — pipeline, highway, waterway, railway or airway — can function for more than a short period of time without adequate maintenance services. Maintenance services may be thought of as the "lifeblood" of transportation and thus of civilization. Without them, the movement of people and things would come to a halt.

Throughout the world people are described more and more as being "on-the-move." As more people and things move faster and more efficiently, factors of transportation safety appear even more important. Lives, health and well-being for more and more people depend upon adequately maintained transportation services. In addition to safety, the environmental influences of transportation services are increasingly recognized as being of great importance. Whether or not more of our environment is polluted beyond control may well depend as much upon the quality of maintenance services as upon the original design of a given form of locomotion.

Transportation job analysis clearly shows that various modes of transportation — or various carriers — have more things in common than in difference. Thus, careful and detailed understanding of all modes of transportation is important regardless of which particular mode is the one to which a student aspires. Also, no mode of transportation today is used without some relationship to one or more of the other modes. Thus, the interface between modes is important in understanding total transportation

Transportation maintenance services require growing numbers of workers. The levels of jobs to be performed range from relatively simple to highly complex and technical or para-professional.

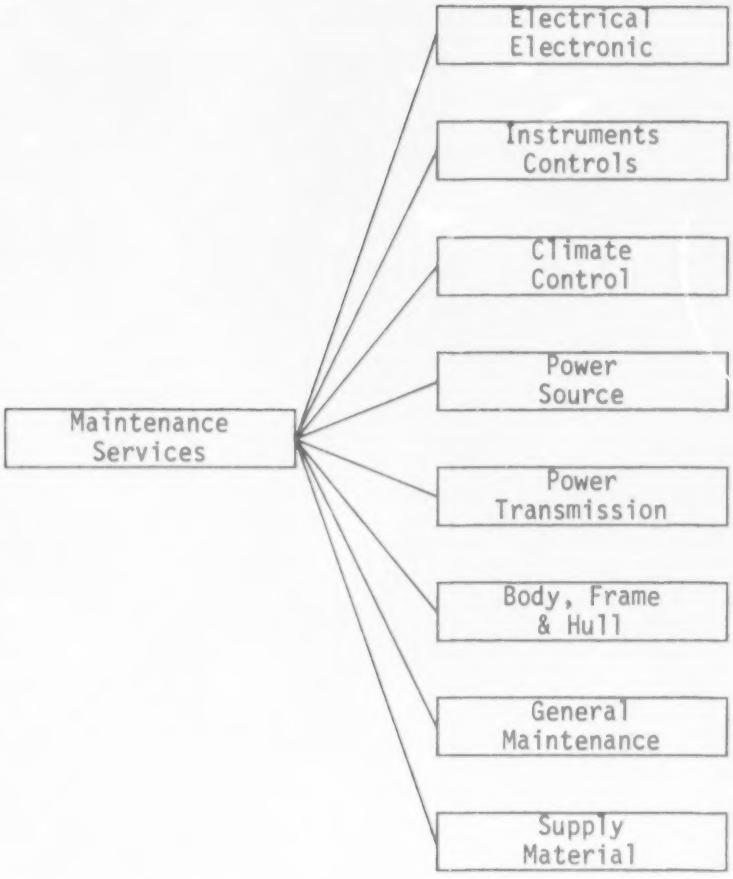
It is growing clear to career guidance and counseling experts that maintenance services relate to all modes of transportation and that preparation with a specialty related to one mode has generally high transferability to jobs in other modes. In short, instead of a career ladder within one specialty, more of a career lattice appears feasible.

In America, we are moving rapidly from a predominantly rural or agrarian society to an urban way of life. Until recently we depended more upon human and animal muscle power for transportation. We are now moving rapidly into a high speed, micro-miniaturized, flexible society that demands speed, economy, safety, efficiency and decreased degradation of environment.

We are moving rapidly from a production economy to one that relates more to services. With increased population, wealth, leisure time, mobility, education, improved health and longevity, maintenance services for transportation offer growing numbers of jobs for all skill levels while at the same time offering promotion and job security as well as interchangeability of jobs between transportation modes.

Anyone who prepares for a career in transportation maintenance services will soon recognize that his job, his function is crucial to man's survival.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this field are by no means the exclusive property of any one occupational group. This will be as true of this occupational group as it is of the others in this field, and it should be kept in mind as one reads the outline of Maintenance Services which follows.



Model 3d - Maintenance Services
Occupational Group

DEFINITION

Maintenance service personnel are responsible for the proper operation, care and control of the equipment and facilities which are required to carry, house, store or service the needs of transportation. The range of skills crosses the spectrum from the menial to critical diagnosis, evaluation and repair.

SCOPE

In an earlier age, wheelwrights, millwrights, and blacksmiths performed services that were essential to the expeditious movement of goods, people and services. Today, workers who aspire to success in maintenance services must combine all the abilities of those craftsmen of earlier times with new techniques. The term aptitude — meaning the potential, inclination, or "bent" toward an occupational group or career field — is a term well known to students, parents, teachers and employers. Those who wish to enter maintenance service employment and advance above the entry levels should have aptitudes that include: mechanical, manipulative, numerical, and scientific. Additionally, depending on the level of responsibility, aptitudes including verbal, administrative and social should either be evident or potentially available.

Maintenance service personnel should be able to function with little supervision. They should have a strong desire to do complex jobs, on expensive devices in a rapid, accurate and safe fashion. In many instances both lives and dollars will depend on the quality and quantity of their work.

All forms of transportation seek all-weather, year-round operation. Thus, maintenance services workers may be called upon to work in all kinds of weather and climate conditions.

SOCIETY AND MAINTENANCE SERVICES

Modern, mobile civilization could not function without maintenance services. The operators of transportation services, as well as many of the members of the public using them experience direct and frequent contact with maintenance service personnel. When trouble arises, when there is a malfunction or when transportation elements fail — the first person consulted is a member of the maintenance services team.

With today's high level of scientific and technological development in all fields of transportation, it is not unusual for a maintenance services employee to work on multi-million dollar devices or systems. A modern completely equipped civil aviation jet transport, for example, may be worth as much as twenty million dollars. A truck, locomotive, ship or pipeline control center may be valued from hundreds of thousands to millions of dollars. Remuneration is in accordance with responsibility.

As America approaches the end of the twentieth century, it is clear that urban areas will be revitalized by transportation services now being modernized or installed for the first time. In less polluted areas, new towns and industrial park developments will develop on the basis of available land, water, pipeline and air transport. Increasingly greater numbers of people will require transportation and more maintenance services of higher standards of reliability and safety will be required. Maintenance services workers will provide essential support to the progress of our nation.

MAINTENANCE SERVICES CORE

While jobs in Maintenance Services fall into certain broad categories there are nonetheless basic elements which do appear to be common in this occupational group. These will involve knowledge or mastery of:

Importance of Maintenance Functions

Basic Tool Skills

Basic Machine Operations

Principles of Mechanics

Manual Dexterity

Importance of Record Keeping

Comprehension of Technical Directions

CAREER LATTICES

Within transportation maintenance services, vertical mobility is clearly evidenced by the multiple levels present in the jobs. Within the job families, lateral movement will be facilitated because of the common elements included within these jobs.

There are only a few lateral moves possible outside these job families because of the specialized nature of the skill and knowledge requirements. Specific possibilities are electrical-electronic employees moving to instrument maintenance and power utilization and mechanics to power source mechanics.

RECOMMENDED RELATED COURSES

Because this occupational group involves a broad variety of jobs, there is an equally broad range of courses which can be helpful in preparation for this kind of employment. Courses in all of these fields are available in major high school and most are available even in the intermediate or smaller sized high shcool.

Courses referred to in the following list are primarily basic in type:

Biology
Bookkeeping
Business Machines
Chemistry
Electricity
English
Machine Shop
Mathematics
Mechanical Drawing
Mechanics
Physics
Psychology
Radio
Sheet Metal
Speech
Typing
Welding
Woodworking

MANAGEMENT SERVICES

Management Services involves the skills required to oversee and control a transport activity. Training for it includes general management concepts and skills related to the movement function.

It is probably most accurate to say that this occupational group describes a set of job families rather than a single career area. Moreover, it is limited to firms engaged in the transportation business and does not include government agencies, planners or other non-carriers. The particular job families which emerge for consideration are in those areas not included within the other occupational groups in transportation.

Basic Considerations

Certain considerations are basic to the study of transportation Management Services:

Transportation is an industry, and contains within it all the basic management functions common to all industry. Although not unique to transportation, management services are needed to support business operations in transportation.

Most of the basic functions are only marginally different for transportation from what they would be for any other industry; therefore, some in-service training would be important for the identifiable items in management that are unique to transportation. Initial employment has been possible often without specific preparation related to transportation. However, it is advantageous for the employee to enter employment with a general overview of the transportation industry.

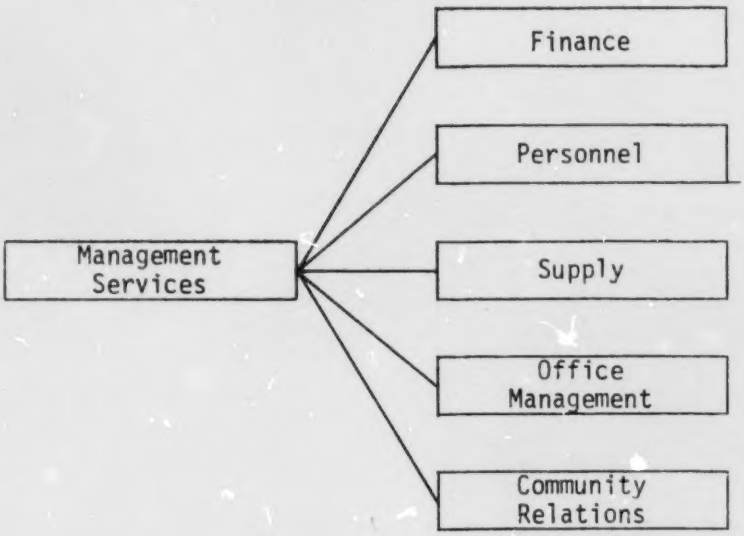
As in other industry, further training is necessary for upward mobility to better positions. The skills and knowledge may be acquired through organized on-the-job or in-service training programs; attendance in classes at a school; or possibly both.

Although the functions must be performed within all firms, there are varying personnel skills required depending on the size of the firm. A small carrier may have one individual performing all or most of these management services, and a large carrier may have a management staff numbering in the hundreds. A large firm has been used as a model for considering these various functions, recognizing that many of them may be performed by a single individual in a smaller firm.

The functions are considered to be important ones, in that they are essential to the effective management of any business firm. However, with exceptions as noted below, they are not particularly unique to transportation, although knowledge of this specific industry will be essential for effective job performance and advancement. Potential for advancement is essentially the same in all enterprises.

The exceptions, which appear to be unique to transportation, are found in the field of community relations. This has been a special problem area for transportation associated industries because of the industry's immediate impact on the environment and the intimate contact they have with the general public.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this cluster are by no means the exclusive property of any one occupational group. This will be as true of the others in this field, and it should be kept in mind as one reads the outline of Management Services which follows.



Model 3e - Management Services
Occupational Group

DEFINITION

Because other sections related to this occupational group discuss management services in some detail, the definition of this group can be made relatively brief. Most simply, management services is managing. However, due to the fact that many companies in transportation have become vast and complex, management of these enterprises has become equally complex and involves a number of specialties.

Broadly speaking, this occupational group may be said to consist of four divisions. These are finance, personnel, supply, and office management.

There is also a fifth division which is sometimes included in this occupational group. This relates to community relations. This is the portion of this occupational group which most overlaps with other groups in this field. In a number of the following pages, community relations is included as a function of this group, but his particular qualification is connection with it should be kept in mind.

SCOPE

The increasing complexity of the managerial functions in the highly technical industries associated with transportation places demands upon the various strata of management far beyond those of just a generation ago. The extent of available knowledge, the mix of skills and the types of ability and performance that were adequate in earlier periods of American enterprise no longer assure business success. The change has been punctuated by technological developments, new impetus on quantitative methods, rising standards of public responsibility, greater impact of government upon business and extensive growth in international operations. Managerial staffing must not only be done in proper qualitative measure, but in a proper quantitative spectrum as well. Leaders are needed who can assume the broader requirements of the current demands. Managers must remain in a high state of training lest they soon find themselves obsolete. A manager's training must be continuous and this is a requirement of both individual and company efforts.

A modern transportation firm needs both specialists and generalists in its management structure. Specialists are managers whose responsibilities are concerned with one functional area of the firm: i.e., finance, personnel, research, etc. Specialists require and utilize expert knowledge in their respective functional fields. At some level of the organization, at least certain managers must rise above specialized niches and oversee several functional areas blending the many activities into a unified operational team. This resolution process requires a general manager who has at least some working know-how in each of the functional specialities he supervises and sufficient exposure to the overall busiress organization to that the efforts of all departments are directed to the ultimate benefit of the entire enterprise. Since just one special field of knowledge is inadequate background for the general manager, the company has to continue to expose its management trainees to as many aspects of the organization as is possible and practicable.

Personal qualities that have generally been recognized as essential for the good manager include such traits as ambition, cooperativeness, dependability, fairness and ingenuity. More important, however, the manager must be able to create a harmonious whole out of the myriad of all-important elements that make up the firm.

Often the effective manager accomplishes work through the efforts of other individuals. He needs to be able to develop

the confidence and support of others with minimum irritation. The manager will be called upon to face problems challenging his capacity to think and react. He must be able to discern problems, devise solutions, analyze data and exercise good and reasonable judgement.

In management services the individual is required to participate in the decision making process. He must be careful to avoid allowing repetitive tasks to become routine lest he fail to notice changes, deviations, and subtle variations. He must remain fully aware of the "forest" despite the "trees" that attempt to cloud his vision. He, the management man, is the brains, the senses and the pulse of the entire business concern.

Management personnel have varied career potentials. While there is usually much stress and many mental demands placed upon the manager, he does receive in addition to his above average compensation, social recognition both within the company and the community. A successful manager is often sought to participate in extra-company activities, both job related and of a community interest nature. More often than not, he is expected to supervise himself and to seek means of self improvement and professional development. He has the opportunity to participate in off the job conferences and to associate himself with professional associations and schools outside the business organization.

Further, transportation management services offers extensive psychological rewards to those who enter and advance within it. Remembering that managerial personnel at all levels are responsible for decision making and policy making, the interested and dedicated manager soon finds that he is respected and looked up to by his co-workers and by his subordinates. The tasks he is assigned and those he creates for himself soon bring tangible and rewarding benefits and status. He will find that his potential is more frequently than not tapped to the utmost so that his job will rarely degenerate into a daily routine. The challenges are virtually unlimited. The manager need only aspire to achieve the goals he sets for himself.

Management services careers offer opportunity for qualified and trained individuals without regard to race, religion or place of national origin. Persons of foreign extraction and others who have retained language skills in other than English can demand a premium for this talent. Familiarity with customs foreigh to the United States is also advantageous. Members of racial minority groups find rewarding careers in management services including those in which direct public contact is routine. The vast variety of jobs in this field allow exemplary latitude for the disadvantaged as well as the exceptional individual. The physically handicapped

are sought after to perform routine and extraordinary tasks within the management structure. This offers them tremendous opportunities in accordance with their respective capabilities.

SOCIETY AND MANAGEMENT SERVICES

Most managerial skills are common to many non-business activities as well. Management personnel are often invited to organize and direct church, civic and other community activities. They are asked to be members and officers of boards, clubs, associations and public interest foundations. Often, in order to enhance its public image, a transportation company will underwrite managerial employees in their community activities. Many businesses encourage their management personnel to participate in civic matters on company time.

One need only survey rosters of nationally recognized philanthropic organizations, public interest foundations, mutual insurance companies, school boards and university boards to realize the heavy reliance society places upon members of the managerial population to advance the needs and gain the satisfactions that a community of people require in these current times.

MANAGEMENT SERVICES CORE

Because of the concept that all the job families in transportation management are common to all business enterprises, the pre-entry skills required are not specific to the transportation field. The degree of specificity in pre-employment preparation for the job may be indicated by titles such as "Accounting Specialist" and "Purchasing Specialist." Following entry into employment in any organization devoted to transportation services, training development programs or other planned efforts are needed to give the individual the specialized knowledge that makes for a more effective employee.

The items included in the basic core program, many of which have a general management focus, satisfy the requirements of transportation management services.

No other core items are suggested here. But the following list indicates which items in the basic core program are

considered so essential to this occupational field that the skills and knowledge should be obtained before initial employment in transportation management services:

Communications Systems

Management

Geography

Economic Systems

Regulations

Environmental Awareness

Human Relations

Communication Skills

Marketing Business Services

Supportive Business Services

Computation and Mathematics

CAREER LATTICES

Career lattices exist in all of the identified areas to varying degrees, usually depending upon the size of the company involved. In fact, large transportation companies often cross-assign personnel from management to operational sectors. The following are examples of career lattices according to broad categories.

Finance

Training of personnel for this job family is largely based upon bookkeeping and record-keeping skills and develops from this point into virtually every facet of automated data processing, industrial engineering, operations research, review and analysis, taxes and auditing.

Training at the secondary level would initially include basic bookkeeping skills as well as specific clerical skills appropriate to a finance or accounting office. Professional and semi-professional training is essential for advancement into the higher managerial functions of comptrollership.

With minimal formal education beyond the basics, progression from bookkeeper to credit and collections management is possible. Skills with appropriate office equipment will also enhance the value of the individual. With additional education and experience, the managerial employee may become a senior accountant, auditor, budget director, or cost analyst or comptroller. Progression may continue into higher levels of corporate management including membership on the corporate board of directors. Some functions in finance include but are not limited to:

Data Processing
Purchasing
Labor Relations
Financial Policy and Budget Formulation
Cash Flow Analysis
Stockholder Relations
Environmental Decisions

Personnel

Personnel services is a highly demanding career area. Much formal preparation is usually required and this is often tempered by familiarity with the other job families administered by the personnel field, however, opportunities within are virtually unlimited. Advancement, more often than not, requires additional formal training and certification. Some functions of the personnel office include but are not limited to:

Job Analysis
Job Rating
Salary Administration
Recruiting
Testing
Interviewing
Hire Recommendations
Personnel Followup Studies
Manpower Management
Management Surveys
Training, In-house and Cooperative
Fringe Benefit Administration

Contract Negotiation
Grievance and Complaint Resolution
Personnel Department Administration

Purchasing, Procurement and Supply

Promotion potential from entry level as stock clerk, storekeeper, tool crib supervisor, parts clerk or inventory control clerk will depend upon the size and consistency of the company. Opportunities in purchasing, procurement and supply include the actual buying, discovery, expediting and receiving. Purchasing agents are often involved in major policy decisions. Make-buy decisions, environmental control problems, and manpower structure determinations are some of the high level functions in the area.

Office Management

Entry at any level may provide an opportunity for an experienced clerical employee to become an office manager or an executive assistant. The career lattice is similar to that found in any business enterprise with a large office staff.

RECOMMENDED RELATED COURSES

Presentation of this topic is divided into three levels: Essential, Desirable and Helpful. Local requirements will dictate the emphasis to be placed on the suggestions in each category and individual programs and limitations will also have a bearing on the total academic program.

Essential —

- English Composition
- Creative Writing
- Report Writing
- Speech
- Public Speaking
- English Literature
- Philosophy
- Reading Development to achieve a high level of speed and comprehension.

These courses should also stress methods of research, library techniques, and data retrieval.

Arithmetic
Algebra
Geometry
Statistics
History
Laboratory Science: Physics, Chemistry Geology, Mechanics, Metalurgy, or a composite natural science course.
Human Psychology

Desirable —

Charm School: Instruction in etiquette, poise, bearing, customs, courtesies, conducting meetings, arranging functions, etc.
Typing
Shorthand
Graphic Presentation
Foreign Language(s)
Calculus
Computer Programming
Business Mathematics
Linear Programming
Political Science
Economics
Sociology
Geography
Legal Studies
Land Management
Social Issues: Contemporary Affairs, Civics, etc.

Helpful —

Mechanical and Architectural Drawing
Blueprint Reading
Physical Education to improve bearing, self confidence, and skills in such games as golf, tennis, badminton, etc.
Personal Hygiene
Anthropology
Structures, soils and materials
Environmental issues and studies
Occupational safety and health
Survey of biological factors related to food products transportation, packaging, and storage.

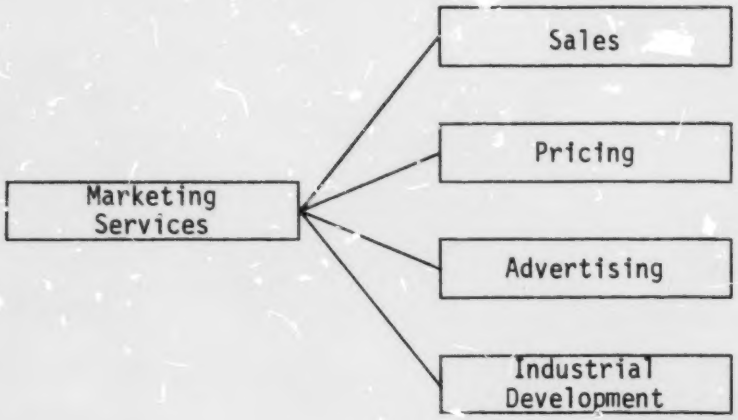
MARKETING SERVICES

Marketing Services in support of the broad area of transportation, is a relatively new concept encompassing many functions or operations of former segments of the industry, as well as some previously unused or under-developed services. These services are now increasingly recognized as indispensable to effective and efficient transportation operations. When combined, they make up an occupational group containing jobs that are growing in number.

Among factors which may influence the growth of job opportunities in this group are population increases, international and national affluence, manufacturing decentralization and diversification, and the increasing impact of technology upon both transportation and other fields.

It should be mentioned that since marketing services as an occupational group covers such a broad area, it has been divided here into four job families. This is necessary because one of these units, pricing, is an important component of transportation marketing services and involves skills and knowledge having little in common with other similarly large segments of marketing services. While this is the most notable instance of such diversity, other significant differences also exist in these job families making up marketing services.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this cluster are by no means the exclusive property of any one occupational group. This will be as true of the others in this field, and it should be kept in mind as one reads the outline of marketing services which follows.



Model 3f - Marketing Services
Occupational Group

DEFINITION

Marketing Services is the distribution of goods or services in the broadest sense of the term. As it is commonly used, the name represents all activity directed toward ensuring the broadest use of products or services among consumers. Within individual fields or even companies, certain parts of this activity may actually be included within a marketing department or may be assigned elsewhere, there actually is no stereotype of marketing services which holds true for any industry. (For instance, public relations is sometimes considered part of the marketing efforts; so is sales promotion; and in other cases both are located in a separate department.)

As this occupational group is defined here, it includes sales, pricing, advertising and sales promotion, and industrial development. Each of these is a relatively broad category; each has a considerable number of jobs within it.

In any industrial setup, marketing services will not only have as its objective the broadest use of products or services by the consumer, but will also seek to accomplish this with the utmost efficiency and with a notable degree of profit to the company.

SCOPE

A knowledge of fundamental operating concepts, principles and strategies of marketing is essential to careers in this group; familiarity with basic principles of psychology and sociology also is beneficial. Competence in accounting, or research techniques, or basic engineering is essential. General business and traffic management knowledge is also very helpful. For some positions, one either must enjoy detailed work or like research or accounting while in sales or customer service a person should be empathetic to others as well as innately friendly.

Except for sales, work is generally indoors. It requires relatively little physical exertion in contrast to the transporting or storing of goods. Thus it can be done by individuals who are partially handicapped. Resultingly, many opportunities exist for employing disabled veterans, other physically handicapped individuals and those from culturally disadvantaged minority groups.

Many back-up jobs potentially leading to middle and top management are available to exceptionally intelligent and motivated individuals.

SOCIETY AND MARKETING SERVICES

An individual employed in the marketing services occupational group can expect to meet and study other people from diverse backgrounds in and outside the transportation industry. Those working in sales, advertising, and sales promotion areas will both seek the informed opinion of users of transportation services and give advice to others, especially as a result of their interpretations of research and cost analysis studies. (For example, top management will rely heavily on the judgments made by statistical and research assistants, cost accountants, engineering technicians and industrial planners.)

To those seeking opportunities to exercise creativity and ingenuity, this group offers stimulating challenges in such positions as advertising, copy writing, graphics, and media selection. For those interested in improving our natural environment, opportunities in the professional occupational component of real estate and environmental specialization abound.

Those choosing career entry into any of the above demanding positions can expect high monetary and psychic rewards leading to above average income and personal development from working in conditions conducive to self-realization.

The circumstances relating to marketing services are not all that bright — there is another side to the story. This has to do with the fact that marketing is sometimes almost solely identified with "sales" or "huckstering." As a result, young people in particular may have certain resistances to this occupational group seeing it as one where ideals have no place and where integrity is frequently in jeopardy. People in this group are vehement that this is not the case, providing one is involved in the marketing of services which one believes in and which one honestly attempts to sell to the consumer as having value to him.

In addition — and as has already been pointed out in this section — there is much more to marketing services than "sales." This is a situation very well borne out as one examines the list of jobs within this occupational group.

MARKETING SERVICES CORE

As mentioned earlier, there are four major components to Marketing Services — the ones identified here as sales, pricing, advertising and sales promotion, and industrial development — and none of these relates closely enough to each other for a common core to be possible. Therefore, four cores — one for each of these categories — are cited below.

Sales

Effective Speech
Psychology of Salesmanship
General Business Knowledge
Product Knowledge
Basic Marketing Analysis

Pricing

Transportation Systems
Freight Tariffs
Regulatory Traffic Laws and Regulations

Transport History and Pricing
Tariff Bureau Procedures

Advertising And Sales Promotion

Media, Exposure Methods and Production
Graphics
Product and Industry Knowledge
Basic Market Research
Consumer Behavior
Sales Communication Skills

Industrial Development

Industrial Land Utilization
Weights and Measures
Access Limitations and Capabilities
Transportation Availability
Labor Availability
Social Compatibility
Utility Capacities and Rates

CAREER LATTICES

Career Lattices will vary from one position to another and even for the same jobs, since this field involves such remarkably varied functions. The following are offered only as illustrative examples.

1. Salesman to:

   A. District Supervisor
   B. Regional Supervisor
   C. Assistant Sales Manager
   D. General Sales Manager
   E. Director of Marketing

2. Research Assistant to:

   A. Research Analyst
   B. Research Director
      or
   C. Systems Analyst

D. Data Systems Manager
E. Industry Economic Forecaster

3. Cost Accountant to:

A. Senior Accountant
B. Assistant Comptroller
C. Comptroller
D. Director of Finance

4. Real Estate Specialist to:

A. Community Planning Representative
B. Real Estate Manager
(Procurement and Development)

RECOMMENDED RELATED COURSES

Introductory Business
Introductory Accounting
Commercial Correspondence
Principles of Communication
Commercial Law
Introductory Economics

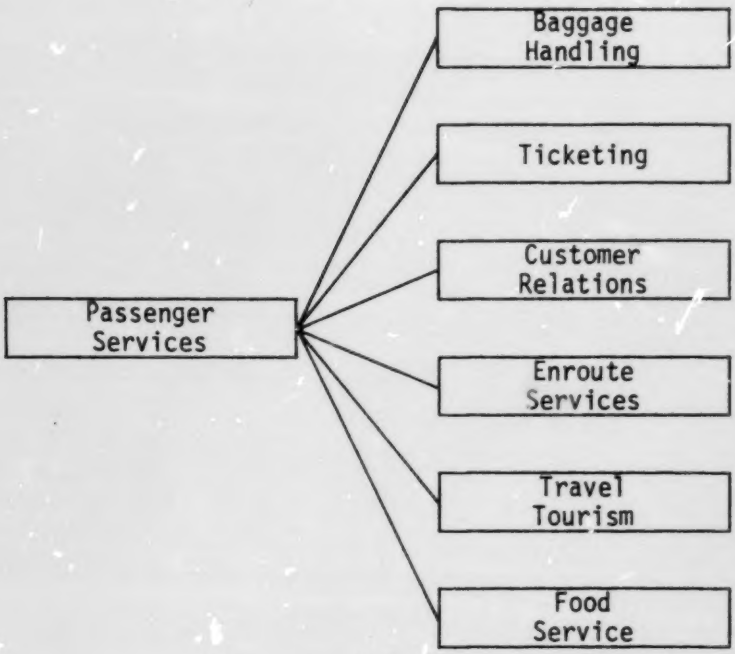
PASSENGER SERVICES

Passenger Services consists of occupations which provide direct service to the customer. Except with a relatively few jobs, this service is rendered in circumstances involving direct contact.

There is a remarkably broad range of jobs included in this occupational group, going well beyond such positions as travel agent, reservations agent and airline stewardess, which one most commonly associates with this group. In addition, the possibilities for promotion in this occupational group are much more outstanding than one might initially think. It is not sufficiently appreciated, for instance, that top management positions in transportation are often filled by those who have had experience in passenger services.

Because the jobs in this occupational group so very often involve direct contact with the customer, it is most important that employees in this group possess excellent skills in human relations. The fact that this occupational group so heavily depends upon such skills is probably one of the factors which make it most attractive to young people. An equally attractive fact is that this occupational group is one of the fastest growing areas of employment in air transportation and very probably in other modes as well.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this cluster are by no means the exclusive property of any one occupational group. This will be equally true of the others in this field, and it should be kept in mind as one reads the outline of passenger services which follows.



Model 3g - Passenger Services
Occupational Group

DEFINITION

Passenger services consists of occupations which provide direct service to the customer. The person employed in this field is the one who discusses the utilization of the service with the customer; greets him as he travels; deals with him at the point of destination; and services his needs while he is enroute as a passenger.

Persons in these jobs also handle the services that are periferal to the transportation process. (The most notable instance of this would probably be handling insurance for persons in transit.)

SCOPE

This occupational group brings the individual into daily contact with people from all walks of life and all ages, from the highest to lowest income groups. Help, advice and directions are solicited constantly by travelers.

The talents required of people working in this group include an ability to communicate with people on a one-to-one basis; a knowledge of human dynamics; and the knowledge and ability to remain calm in a hurried situation. The individual must have the foresight and spirit to work as a team member. In these often hurried occupations, the individual must have the ability and command of language to give clear, concise, yet adequate directions — on occasion in a dangerous or panic situation.

An attitude of cooperation is a fundamental need in this area, and if the individual has this as a basic ingredient he will do well and will achieve success no matter whether he be handicapped, disadvantaged or from a minority group. The desire to serve his fellow man will put him on a par with anyone in the field.

Work may be seasonal or year round and either indoors or outdoors. Satisfactions involved will include: meeting new people; learning about human nature; developing the ability to judge people; learning geography of the world; learning languages of the world; helping handicapped, elderly, youth, etc.; and developing ability to converse with people from all walks of life.

SOCIETY AND PASSENGER SERVICES

Persons employed in passenger services are those who have the most frequent one-to-one relationship with customers. This also means that to the consumer of transportation services, they are also the most visible.

This introduces a number of complexities into the life of the person employed in this group. The airline ticket agent may be blamed by the passengers whose flight is delayed despite the fact that this is a circumstance for which he has no responsibility at all. Similarly, the airlines stewardess may have to brave the wrath of passengers enroute who miss connections when it is something over which the stewardess obviously has no control.

Balancing this somewhat, is the fact that people working in this occupational group also receive compliments for matters which are equally beyond their responsibility. The airline stewardess is complimented on "a smooth flight"; the ticket agent is complimented on facilities being ready on schedule; the passenger returning from a long trip thanks his travel agent for the fact that everything went so smoothly.

It is obvious that the traveling public often considers persons in these jobs to have a degree of authority which they simply do not possess. People employed in this group enjoy prestige, public recognition (whether positive or negative) and great variety in their day-to-day contacts with customers. On the other hand, they often have to work on varied shifts; they must be prepared to put in overtime; and they must work under very disciplined conditions. Beginners in this field are likely to receive somewhat lower salaries than the public might think, but opportunities for promotion are often excellent.

A substantial reason for people regarding men and women who hold these positions with a certain amount of envy is their obvious fringe benefits. Often their positions will involve frequent travel; even if their jobs do not involve this, they will be able to do personal travel at greatly reduced rates, or even without any cost whatever; and they are seen as having glamour positions. What the public does not see is much of the tedium which these positions will involve — largely because the person really skilled in handling such a job does not allow this to become apparent to the customer.

People in this group represent the "fact," the "voice" and the "arms" of transportation to the traveling public. In turn, all of these jobs involve all the approbation and censure which will go with such a high degree of visibility.

PASSENGER SERVICES CORE

The core of skills common to all job titles within this field is one centering about human relations. Emphasis must be placed on the human relations capability beyond that included in the basic core. The fact that the employee in passenger services represents the company in his person-to-person relationship with the customer requires that he be able to courteously and effectively personalize this service. Not all jobs in this group are

directly involved with the customer in face-to-face encounter. However, this relationship tends to characterize the occupational group.

For this reason, the following skills, competencies, or qualities are given as the core:

Skills in Speech
Provide Concise Information
Interpret Schedules and Routes
Relate to Others in Varied Situations
Handle Crisis with Calmness
Deal With Difficult People
Present an Attractive Appearance

CAREER LATTICES

There is a supervisory level in all of the job areas. This assures a degree of ladder effect. The ticket agent position is one among the several which most often lead to management positions such as passenger agent, sales representative, district sales manager, as well as to top management. Employees need not begin at the lower level of ticket agent to enter this sequence. They may move into this sequence from such positions as steward/stewardess, baggage agent, tour and travel agent, customer relations.

MISCELLANEOUS INFORMATION

It is worth noting that now and in the future the impact of universal mechanization will reduce the need for jobs identified in the lower levels. There will, as a result, be a demand for technicians to maintain such equipment as well as for machine operators.

Persons with degrees interested in careers in transportation management often begin in passenger services. An understanding of the general business operation of a transportation industry is fairly readily gained here. The passengers service occupational group overlaps significantly with the following groups: Marketing Services, Distribution Services; Management Services; and Safety Services.

RECOMMENDED RELATED COURSES

Typing
Bookkeeping
Social Studies
Public Speaking
Accounting

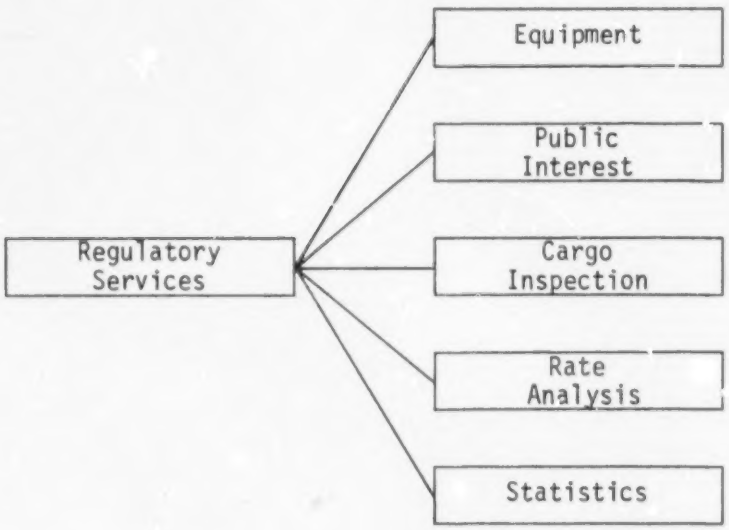
REGULATORY SERVICES

The transportation industry in the United States today is extensively regulated by government agencies. These range from the U. S. Department of Transportation — which includes the Federal Aviation Administration, the United States Coast Guard, the St. Lawrence Seaway Development Corporation, the Urban Mass Transport Administration, the National Highway Traffic Safety Administration, and the National Transportation Safety Board — to the Interstate Commerce Commission, the Civil Aeronautics Board, and the Federal Maritime Commission, to the state regulating agencies and to those at the municipal level. This regulation involves operation (safety, weights, vehicle specifications), economics (charges or rates) and entry and abandonment of carriers and routes. Virtually all positions in transportation and distribution require an awareness and understanding of the extent of these regulations and the unique quasi-public characteristics of a private industry operated for profit.

A variety of challenging jobs and opportunities exist in the general area of regulatory services. However, because a relatively high degree of specialization is required for these positions, a cluster core, superimposed on the basic core requirements, is not feasible. Rather, each position carries its own unique requirements.

Individuals employed in regulatory services have a high degree of potential for advancement in the industry or for entry into related careers in distribution or other aspects of transportation. Realistic potential positions for individuals with background in this area will include positions as supervisors, bureau heads, department heads, and even corporate vice presidents.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this group are by no means the exclusive property of any one occupational group. This will be as true of the others in this field, and it should be kept in mind as one reads the outline of regulatory services which follows.



Model 3h - Regulatory Services Occupational Group

DEFINITION

Regulatory Services requires skills in understanding, interpreting and making use of the rules and regulations issued by regulatory bodies at the various levels of government. Appropriate training includes administrative, interpretive and investigative activities as well as technical and statistical skills.

SCOPE

Two distinct types of jobs emerge in this occupational group; one includes those jobs that are oriented to research and analysis, while the other is concerned with field service responsibilities. While some overlap occurs, there is sufficient difference to warrant separate listing:

Research and Analysis Oriented

To perform well in the research and analysis oriented job families, an individual should possess:

Talents: Oral and written communication skills, ability to use logic, analytical ability, ability to deal with numerical concepts, reading comprehension and retention.

Personality Traits: Patience, persistence, independence, ability to withstand pressure, enjoyment of problem-solving.

Employment: Work will be performed indoors in a department which may be of any size, but usually with a fairly quiet atmosphere. Work is on a year round basis. Since these jobs usually require a minimum of physical mobility, they can be filled by individuals with physical handicaps. Since many of these positions are complex and demanding, the exceptional student could find they offer definite challenge.

Field Service Oriented

To perform well in the field service oriented job families, an individual should possess:

Talents: Oral and written communication skills, analytical ability, and reading comprehension and retention.

Personality: Perceptiveness, flexibility, personal integrity, healthy self image, tact, respect for law and regulations, and enjoyment of public contact.

Employment: Year round, steady, with time spent either in an office setting, or with some portion spent in outside contacts with the industry. In higher levels, some travel may be involved.

In both types of jobs, satisfactions are largely innate. However, because of possible contact with diffused segments of the industry, potential exists for direct satisfaction from an outside source. A person involved in enforcement procedures must contend with contemporary societal images, which tend to be derogatory. Innate satisfaction arises from using discretion in the application of regulations and from serving as liaison between a regulatory body and the public.

SOCIETY AND REGULATORY SERVICES

Research and Analysis Oriented

Societal contact is severely limited, being confined almost entirely to interaction within the department. Contribution to society rests with performing research and statistical activities from which cost savings and improved regulation can result. No direct societal reward can be anticipated since most people are virtually unaware of this occupational group.

Field Service Oriented

As previously mentioned, travel may be a component of this occupational group's job activities, with public contact almost always an associated activity. An individual may be involved with explanatory, advisory, and enforcement roles, and thus find that the public relies heavily on his capacity and position. The opportunities for direct reward are ample. Moreover, in these contacts specialized knowledge will be applied to situations which will tend to engender respect.

REGULATORY SERVICES CORE

There is not a great deal of commonality in the kinds of specialization required for the various positions involved with regulatory services. Certification by recognized associations might come as close as anything to a cluster core requirement.

Common elements include:

Public Utility Concept
Transportation Law and Regulations
Technical Communicative Skills
Principles of Tariff Construction and Interpretation
Economic Geography
Rate Applications
Human Relations
Principles of Market Analysis

CAREER LATTICES

An individual entering this field as a rate clerk has direct potential for upward mobility to a position as an analyst or supervisor. This experience could, in turn, allow a move from the specific regulatory services group into the area of traffic or physical distribution management.

Similarly, an individual who has gained experience as a field service representative with a regulatory agency could easily move into a position with a carrier or with industry.

Since regulation is a persuasive force in all aspects of the industry, training and experience gained in this group can be utilized for advancement in virtually any area of the industry. The foregoing are cited only as examples of what can occur.

MISCELLANEOUS INFORMATION

In this group, utilization of community resources is absolutely essential. Cooperation of industries, carriers and government agencies must be developed so that access to real life experiences and information is available to the student. Perhaps some type of advisory council, composed of representatives of the above-mentioned areas, could be established to provide a direct involvement of the transportation community in the program.

RECOMMENDED RELATED COURSES

Communication Skills
Economic Geography
Economics (Micro and Macro)
Business Organization
Management Concepts
Government Organization
Human Relations
Psychology
Sociology
Data Management
Computer Applications
Labor Relations (Collective Bargaining)

SAFETY AND SECURITY SERVICES

Transportation is an especially high risk system, one in which accidents may cause heavy losses of life and property. Therefore, safety services are crucial to public acceptance and use of the transportation system. Safety in all phases of transportation must have the highest priority in the development of the system for the future.

Safety systems are highly dependent on technology to assist in eliminating hazards. However, safety programs are most dependent on the personal attitudes of the individual. Analysis of accidents shows that attitudes are a major key in accident prevention. Most attitudes are well established before one enters formal education or training programs. To effect significant behavior change, this fact must be recognized and activities, experiences, projects and programs must be addressed to those attitudes that lend themselves to remediation.

A major characteristic of safety systems in transportation is the high amount of interdependence on others in the system in relation to accident causation and prevention. Public safety consciousness is being developed but must be promulgated further by the carriers and by the users of transportation. As public and governmental pressures increase, more employees will be needed to meet and comply with the resulting safety regulations. People will be needed for inspection, enforcement and development of safety systems and programs, and development of safer vehicles and equipment.

The increasing mobility of the population in the nation and in the world, and the great expansion in the movement of goods, projects a spectacular growth in the numbers of jobs generated by the rising safety standards in every area of transportation. It

has been estimated that 50,000 to 100,000 additional jobs will develop in the transporation safety field in the middle seventies.

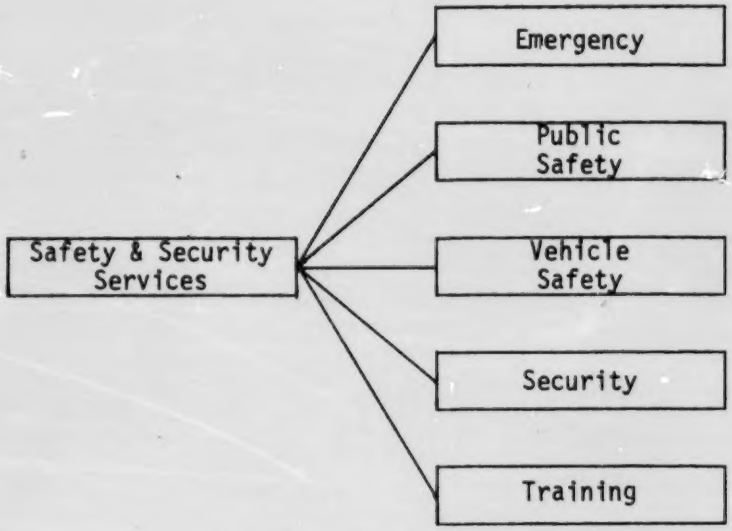
There is also a great demand in the transportation industry for security personnel. Loss prevention services must be available to all phases of transportation.

Today the loss prevention concept goes beyond the mere stopping of crime. It has to do with the prevention of loss in every way and at all levels.

As a result, loss prevention is now developing into one of the most important functions in transportation. It is no exaggeration to state that attitude plays the major role in loss prevention. It is therefore paramount that loss prevention personnel be dedicated to bettering relationships between men.

The object of training for this program is to provide the student with knowledge of the many areas of responsibility. The qualifications necessary for this group will vary and depend upon whether a person decides to specialize in any one phase, or to undertake a complete comprehensive study in the art of prevention. Security in transportation should never be underestimated. The mobility of the equipment, the wide geographical dispersion of the components and the high value of prime movers and cargo, coupled with the extensive real estate holdings governed by the doctrines of strict tort liability, all serve to compound the problems of loss prevention in the transportation industry.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this cluster are by no means the exclusive property of any one occupational group as it is of the others in this field, and it should be kept in mind as one reads the outline of Safety and Security Services which follows.



Model 3j - Safety & Security Services Occupational Group

DEFINITION

Transportation safety and security services is the application of skills — along with the proper personal safety and loss prevention attitudes — required to minimize or eliminate the hazards to goods and people during all transportation activities. Such services include the attitudes and skills involved in training, communication, engineering, research, investigation, analysis of data and licensing.

Much of the safety and security occupational need stems from responsibilities of employers as a result of the 1971 Occupational Health and Safety Act as well as increased consumer and safety and security interest evidenced by the public.

SCOPE

In the safety and security occupational group the specific jobs performed require a broad range of skills, knowledge, attitudes

and experience. Each specific job will occur in a setting that is rather unique in its requirements as compared to similar jobs round in different geographical locations, agencies and industries.

The talents required in safety and security occupations are many and varied but specifically the individual should have a strong desire to prevent accidents, save lives, eliminate bodily injury and decrease property loss and damage. Many of the jobs within this occupational group deal with people and property that have been involved in an accident or loss situation. This often requires an employee who can cope with unpleasant and adverse situations. Personal satisfactions accruing from occupations in transportation safety and security include an important contribution to a major industry, service to fellow man, the challenge to improve upon the safety and loss record of the transportation system, job security and job benefits.

Safety and security services offer opportunity for qualified and motivated individuals who are adequately trained in the myriad of skills and professions included in this occupational group. Matters of race, religion or place of national origin are largely off-set by the variety of special attitudes and attributes displayed by members of minority groups. The vast variety of skills demanded in this job area allow extraordinary latitude for the disadvantaged as well as for the exceptional individual. The physically handicapped are sought to perform tasks within the safety occupational area in accordance with their respective capabilities.

Many jobs in this occupational area are with public agencies at the federal, state and local levels. Jobs occur on an annual basis with changes in emphasis resulting from the type of job, geographical location, weather conditions, time of the year and the employing establishment.

SOCIETY AND SAFETY AND SECURITY SERVICES

The overall objective of the transportation system of this country is to move persons and goods to a desired destination efficiently, rapidly and safely and securely. Efficiency and rapidity can only be accomplished if safety and security receive equal emphasis.

People have come to expect a great deal of security to be involved in transportation systems in this country, not only

when they themselves travel but also when property is shipped. When exceptions to this occur the outbursts are noisy and prolonged. Within recent years, this has been very evident in the field of air transportation. Hijackings have received attention to an extent that could be considered surprising in view of the total number of persons and incidents involved — were it not for the fact that security in travel is so highly prized. The same is true with thefts from airports. In view of the total volume of these thefts, they would not appear to merit the public attention which they receive — but again, travelers can be tremendously disturbed by the idea that their luggage or possessions might not reach their destinations undisturbed.

All of this indicates that persons who work in the safety and security services area of transportation systems are very much in the limelight when things go wrong. They may receive censure for matters that are actually beyond their control. And conversely, when their activities result in matters going very smoothly, their accomplishments are likely to be totally overlooked by the public.

People engaged in jobs within this occupational group actually vary greatly in their direct contact with the people and the goods being transported. Persons in some of the most sensitive jobs in this occupational group may have relatively little direct contact with the public. Only when things go drastically wrong may customers of transportation services become aware that their jobs even exist.

The individuals employed within this occupational group contribute to society through saving lives, through helping to bring about a decline in misery and suffering due to accidents and thefts, and through economical savings involved in good crime-prevention and accident-prevention programs.

For these contributions society offers a fair degree of job security, competitive salaries and a relatively high degree of status within the industry itself.

It should be mentioned also that persons in this group sometimes come in for severe criticism; but when things go drastically wrong, they actually have a fair degree of job security and are not likely to be discharged or demoted for things that are beyond their control, despite public clamour which may be engendered.

SAFETY AND SECURITY SERVICES CORE

There is a fund of knowledge and information which safety and security specialists must have in order to perform successfully in preventing or eliminating the hazards of the transportation systems.

Safety and security specialists must know the systems and the range of safety devices which are currently or prospectively in operation, as well as the types of safety programs which have been successfully operated. This involves a precise knowledge of the chemical and physical qualities of materials, specifically those which constitute a hazard in themselves as well as those which are highly susceptible to accidents. The safety specialist will also need to know the health implications for people of the various risks which materials may generate. Health implications include both the nature of the effect upon people and the activities which may be needed to deal with the consequences of the effect.

While loss prevention services are included in this occupational group, they usually constitute a separate group of specialists from those in safety services. They will require a range of skills and knowledge to those of safety specialists but more particular to their own special areas.

The increasing awareness of the field of environment has so captured the popular imagination that the environmental consequences of transportation activity has become a major political and economic issue of governments at all levels. The areas of air, water, noise and scenic pollution and conservation of natural resources and wild-life are examples of the many forms of regulations for environmental controls which are being developed at this time. Transportation has its share of these regulations and the safety and security specialists should have broad, general knowledge of them.

Laws, regulations and procedures relating to their speciality must be well understood by the person in this group. For instance, federal legislation, such as the Occupational Health and Safety Act of 1971 and the National Highway Safety Act of 1966, have established new standards of safety for industry generally, and regulations based on these acts have been affected by the U. S. Department of Labor.

The following is written in terms of the safety specialist, but equipment knowledge will be required of the loss prevention specialist. It is important that the safety dynamics be understood

by the safety specialist. This field, which involves the psychological sources of human action and includes the use of all senses to prevent accidents, is a potential major source fo study which relates to motivation of people to prevent accidents. The safety specialist will tend in the future to utilize such motivating criteria to create a more safe transportation system.

Since transportation involved the general public to a high degree, the safety specialist must be well versed in community relations. He must interpret transportation safety to the public through speeches and various media presentations.

In the same way the safety area requires a working knowledge of elementary drafting, elementary hydraulics, elementary pneumatics and mechanics, and circuitry electronics. These are the basics which undergird the operation of the transportation system and constitute the framework within which the hazards occur.

Planning
Designing
Instructing
Evaluating
Recommending
Motivating
Checking
Analyzing
Reporting
Correcting
Testing (to standards)
Enforcing
Interviewing
Protecting
Analyzing Systems
Investigating
Testifying
Emergency Communciation
First Aid
Mechanical Skills
Human Relations
Basic Mechanics

CAREER LATTICES

There are excellent career lattice possibilities for people employed in safety and security services. With almost every

job category in this group, people who enter it at a beginning level will find that on-the-job experience will qualify them for several promotional steps.

For instance, a person might enter this occupational group as a training assistant, move to a training specialist, become a senior training specialist, move up to training supervisor and end up as a training director. The same kind of job progression would be available for someone entering as a safety inspector and ultimately ending up as a safety director.

Innumerable kinds of lattice movements are also possible. A safety inspector might move to a job as a security and loss prevention specialist; a safety investigator might move to a job as a safety inspector. A safety engineer might move to a job as a personal safety specialist.

Most of these promotions and lateral moves will be so obvious as one looks through the list of jobs in this occupational group that the subject does not require further discussion here. However, it is worth stressing that the promotion and transfer possibilities in this field are excellent.

RECOMMENDED RELATED COURSES

Almost any courses which have to do with law, safety, human relations, communication and records maintenance will be appropriate as related courses to this occupational group.

Some specific courses which appear worthy of special mention include the following:

Commercial Law
Driver Education
English
First Aid
Fundamentals of Law Enforcement
Fundamentals of Safety
Psychology
Social Studies
Sociology

SYSTEMS PLANNING SERVICES

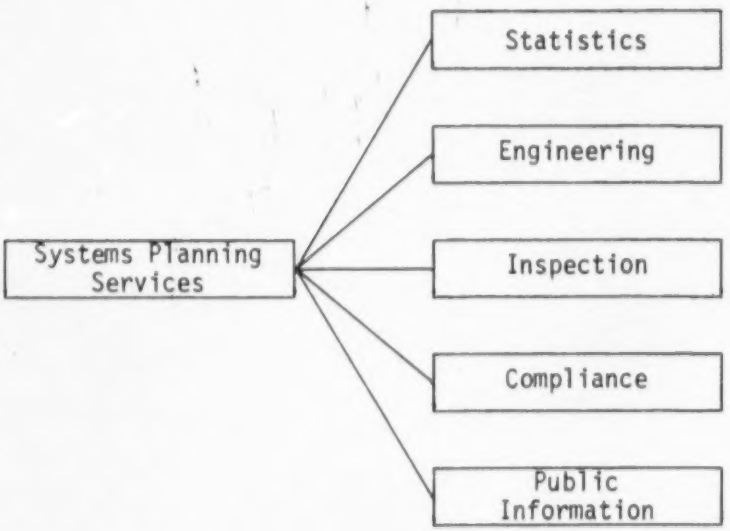
All levels of government have substantial numbers of employees engaged in transportation systems planning. There are also many private engineering, arcitectural, planning and research firms which employ persons trained at various levels of transportation planning. This occupational group has grown tremendously in the past several years and can be expected to continue to expand. There are 50 to 75 thousand jobs in the group at present. The greater the emphasis on environmental planning, the greater the need for planning in transportation development.

Transportation systems planning requires a set of skills different from others in the field of transportation. Jobs in transportation systems planning require special strengths in such technical areas as drafting, applied mathematics, statistics, photography, computer graphics and laboratory techniques. Transportation planning involves close coordination with general physical, socio-economic, and environmental planning carried on at local and regional levels. This places emphasis on a general background and awareness of broad community problems and issues. In this respect, it should be recognized that transportation itself constitutes a prime nucleus for achieving broad economic and social objectives.

The prospects are very strong that more jobs in transportation planning will be created in the next several decades. Public dissatisfaction with congestion and poor public transportation has unquestionably led to greater emphasis on planning and coordination of transportation systems by all levels of government. Within the last several sessions of Congress, numerous bills have been introduced emphasizing more careful and systematic transportation planning. The U. S. Department of Transportation is now requiring the

states to engage in continuing comprehensive transportation planning as a condition for Federal assistance. Increasing numbers of states have established departments of transportation and in the process have expanded the scope of transportation planning.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this cluster are by no means the exclusive property of any one occupational group. This will be as true of the others in this field, and it should be kept in mind as one reads the outline of systems planning services which follows.



Model 3k - Systems Planning Services
Occupational Group

DEFINITION

This occupational group includes the skills required at the planning level for assistance in the design, construction, coordination and implementation of transportation systems. Training in this group focuses on specific skills related to the physical aspects of planning. Entry level positions include: surveyor aide, statistical clerk, photogrammetric specialist, draftsman.

SCOPE

Systems planning services consists of careers that provide excellent job mobility, both vertically and horizontally. This job mobility is most important to the prospective employee since it precludes "dead-end" occupations with the usual frustrations and eventual loss of motivation. The worker can advance within a particular job or, with a minimum of additional training, move over to another area possessing greater financial and job rewards. In addition, the continual growth and expansion of transportation services in America guarantees a steady demand for people trained in systems planning.

A major factor providing systems planning with remarkable scope is that so much of what goes on in this occupational group involves "planning." It is no exaggeration to say that each person employed in systems planning is a member of a closely knit team. In some way or another, each of these teams will reflect planning activity. This means that the work of each person in systems planning has significance well beyond what might be immediately recognized.

Many of the careers in systems planning require a solid foundation in mathematics, communications and natural sciences. Courses in these disciplines, at the secondary and post-secondary levels, attract and retain the exceptional student. Their disciplines offer a challenge to the intellect, and are most appealing to the logical, systematic mind. Proper to those careers of greatest challenge; statistician, cartographer, photogrammetric specialist, and computer graphics specialist.

Each of the careers in this group, with the possible exception of the surveyor, can be efficiently performed by the handicapped. A moment's reflection will immediately reveal that these jobs are primarily indoors, and require minimal to moderate physical movement. To cite several examples: statistician, draftsman, laboratory technician, inspector, cartographer, and compliance specialist. Due to their employment conditions these jobs would be very suitable for the handicapped. However, the type of handicap must be evaluated and a decision made on this basis.

SOCIETY AND SYSTEMS PLANNING

Members of this occupational group have minimal contact with the general public. The nature of the work, combined with the

working environment at present, precludes even moderate public contact. There are, to be sure, several notable exceptions: surveyors, surveyor party chief, inspectors and public information specialist.

As members of a planning team, each technician should relate to the team as a whole and contribute both his expertise and general advice. Team leaders must be trained to recognize and use team inter-actions and reactions, rather than rely on the superior-subordinate role relationship. The value of the technician's contribution must be recognized, and this will require a form of re-education throughout our academic and social structure. On balance, about 18% of the jobs require four years of college, hence, the para-professional must be afforded his proper niche in the career structure.

A member of this occupational group aids society by contributing his skills and expertise to the planning function. The planning function, however, encompasses more than simply surveys, blueprints, or plats. It should, and must, include a list of priorities relative to what utilization can be made of scarce resources. The planning function must consider the long-range effects on the ecology, the community and the country as a whole. Finally, the most crucial, the planning function must consider each member of the society. Planning, and the members of the planning group, cannot operate in a vacuum in the future.

Society will reward members of this occupational group in direct proportion to what the members offer society in terms of its needs and desires. Obviously, there is the monetary reward which sets a measurable value on the service. Society can also provide rewards via the channel of the workers' everyday environment. These indirect, intangible, rewards can be summarized as follows:

1. The opportunity to voice an opinion in the way things are done.

2. The opportunity of the career ladder concept; i.e., a "better job."

3. Pride and a sense of achievement as a team member assisting in the attainment of a specific objective.

4. The respect of others, on the job, his family, his social associates, his community, and,

5. A degree of job security.

SYSTEMS PLANNING SERVICES CORE

The following are broad elements common to all jobs in systems planning:

Drafting

Statistics, Basic Applied

Mathematics, Applied Technical

Use of Photography

Use of Computers

Measurement, Surveying, Data Collection

Local, Regional Government Structure

There are other elements which are common to many of the jobs in this occupational group, but since these jobs are remarkably diversified there are none common to all jobs except those in the foregoing list.

CAREER LATTICES

The nature of the job elements, along with the basic nature of the respective training, suggests that within this occupational group the vast opportunity for worker mobility lends itself quite well to career lattice construction. Movement can be horizontal, diagonal, even multi-directional.

While each job is unique and discrete, there is sufficient commonality and relationship that a worker can move over to another with a minimum of additional training. As the intensity of job specialization increases to upper levels, the horizontal movement may be impeded by the requirement of increasing amounts of training.

Beginning with statistical clerk, the logical movement is to data specialist and then to statistical technician in ladder effect. The drafting aide moving to junior draftsman might have the option of the senior draftsman or cartographer jobs. The surveyors' aide might move vertically to instrument operator and then to surveyor party chief or, having had the basic core or preparation including drafting, he might comfortably move to junior draftsman.

The laboratory assistant (materials) logically moves up the ladder on which he starts. The graphics designer aide moves to layout and design specialist to graphics specialist but because of the relationship to drafting and cartography these doors could be open to him with minimal additional training. The inspector's aide moves to inspector (weights and measures) to supervisor of cost estimation and analysis or possibly to technical report writer or compliance specialist.

RECOMMENDED RELATED COURSES

The following is a list of related and supportive courses that a student could take prior to or concurrently with his major field of concentration. It should be noted that a required course in a given discipline may serve as a supportive course in another discipline.

COMMUNICATIONS ART

- Commercial Art
- Visual Communications

BUSINESS

- Introduction to Business
- Beginning Typing
- Advanced Typing
- Business Law I
- Business Law II

COMMUNICATIONS

- English Communications
- Speech Techniques
- Business Writing
- Report Writing, Technical

TECHNICAL MATHEMATICS I AND II

Structured to provide mathematical tools for students in technical curricula; emphasis on practical aspects of mathematics and less upon the theoretical.

SOCIAL SCIENCE

Principles of Economics
Current Economic Problems
Physical Geography
Human Relations

TRANSPORTATION

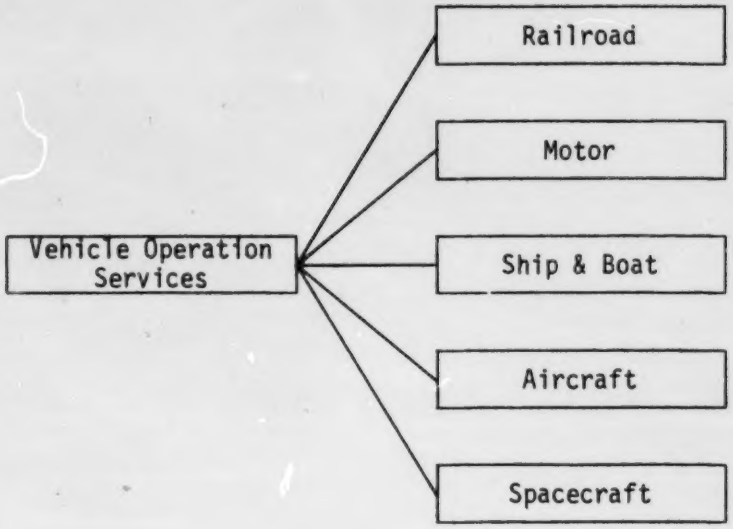
Introduction to Transportation
Basic Principles of Aviation

VEHICLE OPERATION SERVICES

It is difficult indeed to overstate the importance of Vehicle Operation Services to the effective operation of the transportation system. Be it the ship's captain, the airline pilot, the truck or bus driver or the railroad conductor, this person bears on his shoulders the burden of insuring the safe and expeditious movement of the people, goods and supplies that are entrusted to his care. Lacking adequate performance by these individuals, the efforts of all other transportation workers are wasted.

This occupational group is unique for several reasons. First, much of the performance of the job depends upon the inherent physiological make-up of the individual — his reflexes, his physical capabilities, even his eyesight. Also unique to members of this group is the authority granted to them both by tradition and law. The order of the ship's captain at sea is the law, as is the order of the airline pilot when airborne. They are held legally responsible for job performance. Around the responsibility and authority that these individuals have has grown a wealth of both legend and literature. The call of the sea has been answered by thousands of land-locked young men and an aura of glamour surrounds the professional pilot. Folk songs and numerous clubs and collecting societies perpetuate the old-time railroad. The truck driver has also been "typed" by legend.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation. This is unavoidable, since various important functions within this cluster are by no means the exclusive property of any one occupational group. This will be as true of the others in this field, and it should be kept in mind as one reads the outline of vehicle operation services which follows.



Model 3m - Vehicle Operation Services
Occupational Group

DEFINITION

This occupational group is concerned with the actual operation of the vehicles involved in any transportation system.

These vehicles will range from road vehicles and trains to aircraft and ships. Most simply, vehicle operation services may be described as centering about anything which concerns the vehicle while it is in motion. However, vehicle operation services as it is described here covers a broader range of jobs and may be said to encompass all activities involved in the actual physical movement of goods or passengers. Thus the concern of this occupational group goes beyond the vehicle itself and is concerned with the persons or goods that will also be in transit.

Jobs involved in this group range from those of a junior or beginning level to others that involve great responsibility and prestige. To cite water transportation as an example, the jobs can range from that of deckhand to captain.

SCOPE

To work effectively in this occupational group, a combination of inborn physical capabilities, learned skills and leadership ability, all tempered by on-the-job experience and training are required of the individual. Because of the potential for emergency and tragic accident that surrounds all of these careers, a body of law and union regulations has arisen, which prescribes the amount of time each of these individuals can be involved with flying, driving or operating their vehicle. All careers, however, involve working odd hours and on holidays. All operators of these vehicles must possess a personality not ruffled by sudden emergencies and all must be flexible and resourceful in meeting with unseen contingencies. Technological progress has improved the working environment of all of these individuals. They are, however, subject to and influenced by vagaries of weather and unforeseen events. Employment in these careers is characterized by accomplishment of a mission despite the obstacles presented by weather, mechanical malfunction, human failure and chance.

Job performance requirements and existing laws prevent the employment of physically handicapped workers in this occupational group. The group does, however, offer excellent opportunities for the culturally disadvantaged and the entry of minority groups should be encouraged.

SOCIETY AND VEHICLE OPERATION SERVICES

The jobs in this occupational group with the greatest public contact are the ship's captain, the airline pilot, and the bus driver. Subordinates in the plane or ship and passengers in all modes of transportation, look to the vehicle operator for leadership and expect and demand the highest degree of technical and professional competence. In consonance with the demands placed upon workers in this occupational group, all jobs are accorded a high degree of social acceptance. Historically a ship's officer, the railroad engineer, and conductors and in later times the airline captain, have been considered "glamour" careers.

Probably the most lasting contact that society outside the transportation industry has with any particular mode of transportation is made by observing members of this occupational group in the performances of their duties. An intra-state trucking company whose drivers are considered courteous and professional

by the general public will reap a harvest of good will; since these drivers perform their duties in close contact with members of society.

Unthinking, discourteous or unprofessional acts by members of this group can color the opinion of the public toward the entire transportation industry.

VEHICLE OPERATION SERVICES CORE

The unique characteristics of the job families in transportation vehicle operation services preclude the development of a common core of educational elements for all job families included in this area. A breakdown of core elements within job families follows:

Water Transportation

The jobs within this family fall generally into two categories; namely, the licensed, personnel or ship's officers (which include ship's masters, mates and pilots) and unlicensed personnel (which include ordinary seamen, able seamen and quartermasters).

1. No training is required to be an ordinary seaman, the work being learned on the job. A year's experience, in addition to satisfactory completion of a seamanship test is necessary for advancement to able seaman. The experience is vital to the job precluding entry to able seaman with only academic training.

2. Entry into licensed positions can be made by unlicensed personnel with extensive training. Some unlicensed personnel are making this transition with the aid of licensed officer's unions. Three years time as seaman or graduation from an approved training school are required to obtain a third officer's license. Advancement to second mate, chief mate, and master requires experience and successful completion of other examinations.

3. Prior to application for seaman's duties or before beginning formal maritime training in one of the six maritime academies in the United States, courses in the following subjects, organized on an orientation basis, are recommended:

   Navigation
   Electronics
   Cargo
   Naval Architecture
   Seamanship, Safety and Life at Sea
   Regulatory Acts

Exposure to these courses will enable the student to establish a goal of either a licensed or unlicensed career. Should his goal be as an unlicensed seaman, these courses will aid his advancement to able seaman and beyond. For the student who opts for the licensed training, such courses provide the background for the higher education which must follow.

While the foregoing is written in terms of ocean going vessels, it should also be noted that inland waterway and harbor craft offer numerous jobs in this field also, although they are restricted to certain geographic areas of this country.

Rail Transportation

Entry jobs and advancement to various job levels within the rail transportation family are similar to water transportation in that no experience or formal training is required for entry. Advancement is dependent upon seniority and experience. Job progression, once entry is gained, is provided through on-the-job tr ining. Again in this case, orientation type courses which would stimulate interest and provide background information are probably the only practical means available for preparing individuals for vehicle operating jobs in the rail industry. Urban and interurban mass transit means now under development will not change this core.

Motor Transportation

Core subjects for the combined truck and bus transportation operator would include:

1. Traffic rules and traffic regulations (State and Federal)

2. Vehicle Safety

3. Vehicle inspection

4. Driver training
   a. Truck
   b. Bus

5. Familiarization with bus and truck vehicles and component mechanical systems

6. Physical security of cargo and passengers

7. Survey of vehicle operator jobs

8. Truck and bus safety regulations

Aero-Space Transportation

Core subjects would include basic courses in theory of flight, meteorology, electronics, air navigation, aircraft structures, engines, systems and astronomy.

CAREER LATTICES

Sea Transportation

This job family has a clearly defined system of progression. The entry level for unlicensed personnel is as an ordinary seaman followed by advancement to able seaman, and finally able seamen are advanced to the rating of petty officers. Advancement from unlicensed to licensed or officers ratings is possible. The career ladder for ship's officers begins when the third mate, progressing to second mate, chief mate, and finally master.

Rail Transportation

Within this job family there are two career lattices. The entry job of fireman leads to a career as a locomotive engineer, and the entry job of brakeman leads to a career as a train conductor. It is not expected that the new systems of mass transit being developed will alter this pattern.

Highway Vehicle Transportation

No real career lattice exists for this job family. As the skill level of the truck or bus driver increases through on-the-job experience, he may qualify to operate increasingly more complex equipment; while, as his seniority increases, he is given a greater choice of the routes he will drive. Some opportunity for advancement to supervisory positions exists and movement to administrative duties in safety, dispatch and traffic.

Aero-Space Transportation

As the pilot's experience and ratings increase, he may qualify for more complex aircraft and may enjoy a greater mobility within his occupational group. Advancement to supervisory positions or lateral movement into various training positions, can be made. These movements may be made within or outside this occupational group.

RECOMMENDED RELATED COURSES

Courses with high involvement in the principles employed by the vehicle operators include: (The depth of training is determined by which vehicle is to be operated)

Physics
General Science
Math and including Trigonometry
Motor Mechanics
Speech and Diction
Driver Education
Basic Electronics

VEHICLE SUPPORT SERVICES

Vehicle support services is a broad hetrogeneous array of functions related to the movements of vehicles. In this context a vehicle is any means in or by which someone travels or something is conveyed. In other words, it is something that provides a means of transport.

Therefore, vehicle support services are those functions that directly cause a vehicle to accomplish its primary mission, that of moving people and things. Since transportation companies are organized to provide a service, it can be assumed that all jobs in these companies, except for vehicle operators, may be considered to fall into the category of Vehicle Support Services.

However, in order to reach a more manageable classification of job categories, it has become necessary to separate these jobs into twelve occupational groups. Further, in order to avoid duplication, jobs with skills related to other occupational groups will not be considered in this section. For example, there is a separate occupational group for maintenance services. The same might be said for other occupational groups such as data management services. It should be remembered that the important objective is to have the student select and prepare for a job that he likes rather than determining under which of the twelve categories that job falls.

Vehicle support services include all the functions that directly enable the transportation vehicle to accomplish its primary purpose. Examples of such functions are routing, servicing, scheduling, management, utilization planning, etc. — but they do not directly involve hands-on operation or actual repair of the vehicle. It should be recognized that some of the tasks performed in support service jobs can be quite specialized within specific

modes, and many skill similarities can be found among the jobs within various transportation modes, thus allowing for increased job mobility either vertically or horizontally.

The diversity found in vehicle support service occupations, the interrelated nature of the tasks performed in the various modes of transportation, the increasing number of vehicles involved and the changing methodology of control, supervision and operation, results in this occupational group offering good opportunities for initial employment and advancement. In addition, the upward trend in the development of automated people moving systems, those functioning without assigned or on-board drivers, should open up a whole new market for personnel trained in vehicle support services.

In addition to the jobs associated with the commercial/ for hire, transportation companies, students should consider areas related to private or personal transportation. That is all the vehicle support jobs associated with privately owned automobiles, general aviation or boating.

Since all modes of public conveyance as well as private transportation activities require some type of vehicle, the jobs that control, service, observe and analyze the movement of these vehicles become some of the most important in the industry.

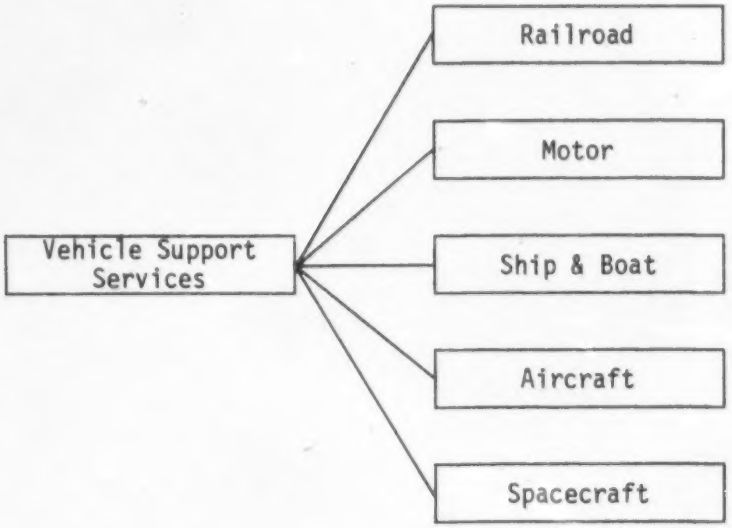
Like many career areas today there are numerous working levels and points of entry here, depending upon one's interests, training, capability, experience and drive. There are intermodal opportunities as well as vertical and lateral opportunities within the job ladders and lattices of the transportation industry.

For example, a passenger agent on the railroad could move over to bus or air transport, using many of the techniques and skills required on the railroad. The ability to meet, serve and communicate with the public is needed on all three modes. However, some of the techniques or even job titles would be different in each of the separate modes. As the automotive manufacturer continues to pour about ten million cars out onto the highways, careers supporting this segment of the industry continue to grow correspondingly.

It is highly likely that for the long term these opportunities will continue to increase at a faster rate than the over-all growth of the expanding transportation industry.

There is a certain amount of overlapping among the twelve occupational groups that constitute the field of transportation.

This is unavoidable, since various important functions within this cluster are by no means the exclusive property of any one occupational group. This will be as true of the others in this field, and it should be kept in mind as one reads the outline of Vehicle Support Services which follows.



Model 3n - Vehicle Support Services
Occupational Group

DEFINITION

As stated earlier, vehicle support services are made up of a broad hetrogeneous array of functions related to the movement of vehicles. In this context a vehicle is any means in or by which someone travels or something is conveyed.

This occupational group encompasses occupations that vary from the skilled operator of controls and switching devices, monitor of instruments, preparer of schedules and routes, assigner and dispatcher of vehicles, instr··or and trainer of vehicle operators — through mid-manageme positions of supervisor of inspection and records, analyzer c passenger and freight records and traffic patterns, negotiator with local, state and federa regulatory agencies — to positions of management in these and

other areas that involve the control, management and/or enforcement through subordinates of safety and other regulations of the transportation industry.

In addition to job opportunities with the major modes the student should also consider and evaluate job opportunities in the private sector (personal autos - airplanes - boats) and mass transit activities.

SCOPE

Within the jobs making up vehicle support services are found tasks relating to data, people, the control of vehicular movement and servicing of vehicles. Most common are tasks of data compilation, recording, analysis and reporting that pertain to operations conveying people, goods, and materials. The data handled involves routes, schedules, and recommendations for improved vehicle operating procedures, services and planning.

The common element of task performance involves the control of vehicular movement at other than operator levels. Examples are: air traffic controller who relays flight information via radio and phone to air traffic controllers and air traffic coordinators of other control centers to maintain safe separation of aircraft, etc.; lock tenders who operate controls and maintain communication to open and close lock gates; traffic controllers who inspect urban transportation of different modes, observe vehicular traffic patterns, investigate delays and problems enroute and recommend promotions and disciplinary actions; dispatchers who coordinate.

Within this occupational group literally every working environment may be found — indoor, outdoor work, seasonal or permanent positions; dispatchers working indoors or equipment inspectors working outdoors; twenty-four hour a day operations.

While the need for vehicle support personnel knows no geographical boundaries one can expect more opportunities at locations where there are larger concentrations of transportation services, e.g., larger population centers where one might find rail, water, truck and air terminals. In order to optimize the investment in transport vehicles it is necessary to maximize utilization. This would cause a continuous need for people, however, there are a few situations where people might seek seasonal or part-time employment. Anything to do with transporting tourists, for example, can provide this opportunity.

The nature of employment in this field requires an aptitude to work with numerical data, the temperament to handle routine procedures as well as make adjustments to established plans, sometimes under considerable pressure. The worker must possess the ability to make an analysis of a situation involving a number of variables and make logical decisions for which he must assume full responsibility for the outcome of his job assignment.

Because of the wide variety of tasks performed on the different jobs there are opportunities for people with a wide span of skills. There are opportunities for the handicapped as well as those who are not.

Similarly the latitude of duties, tasks, and skills required on the job will not prevent job seekers with limited education or experience from securing an entry job. The opportunities to advance are literally unlimited as one gains experience and improves his educational qualifications. Those with higher educational or experience qualifications may enter the career field at a comparably higher level of responsibility.

Although the transportation industry is vast and the vehicle support area is a large segment of the industry, the participant in this occupational group can relate closely to his job within a particular mode because it is a key area in the performance of the overall transportation mission. His job satisfaction comes from this personal identification with a service essential to the industry and in knowing he is involved in an activity that is vital to the welfare of the country.

SOCIETY AND VEHICLE SUPPORT SERVICES

It is difficult to make generalizations about the extent to which persons employed in vehicle support services will come in contact with the public, since there are a multitude of jobs included in this occupational group. However, it can be said that even if the consumers of transportation services do not come into contact with people in these jobs, they will at least be very much aware of how these people fulfill their responsibilities. It is no exaggeration to say that much of the image that the consumer has of any transportation system will be influenced by the way in which people in vehicle support services perform their jobs.

As has been indicated earlier, the person working in this group is also likely to be very aware of the contribution that he

makes to his employing company and the system as a whole. These are key assignments, and the people involved with them receive recognition for the kinds of responsibilities they carry.

People working in these jobs will also have considerable peer recognition. Other employees functioning in the vehicle support areas may seek help from personnel working in this area. This may be even more true than will be the case with users of the transportation services, although they are also likely to bring problems to persons holding these jobs.

Generally society rewards the vehicle support services worker with good pay and benefits, reasonably good to excellent working conditions, and the kind of respect that goes with reliance upon the services performed.

VEHICLE SUPPORT SERVICES CORE

The potential employee in the vehicle support services occupational group should have an understanding of:

The operation and interrelationships of our transportation system.

The types and levels of service that can be reasonably expected from each mode.

The economic need for optimum utilization of transport equipment.

The need for good business practices.

The application for labor saving techniques in an operating environment.

The application of size and weight limitations by state authority.

The use of good management practices.

CAREER LATTICES

Within the occupational group of vehicle support services can be found many avenues of advancement as well as lateral movement within a job family and within the transportation industry from mode to mode. Most of the upward avenues can be determined as a person studies the types of jobs that interest him. However, lateral and intermodal occupational mobility is less apparent.

This is due in part to changes in job title and more specifically to changes in job descriptions as one moves from mode to mode. Because of these differences it is difficult to illustrate a true career that would encompass the many related jobs found in this occupational group.

Conceivably one could move out of the occupational group and return to a higher level position in the vehicle services group at a later time. (For example, brakeman to fireman and then to engineer in the vehicle operation group and subsequently to dispatcher in the vehicle support services occupational group.)

RECOMMENDED RELATED COURSES

Students preparing for the occupational group of Vehicle Support Services may find the following related courses helpful prior to beginning or in addition to taking actual courses recommended for this area.

Typing I and II
Applied Mathematics
Report Writing
Economic Geography - United States
Human Relations
Applied Marketing Economics
Supervisory Training
Business and Office Machines
Basic Drafting - Civil and/or Architectural
Industry Safety
Navigation Air/Sea
Radio Communications
Related Industrial Technology